Final Annual Report on Evaluation, Measurement & Verification Findings for Ameren Missouri Program Year 2015

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with

Final Report
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Definition of Key Acronyms

The glossary summarizes the key acronyms used throughout the EM&V reports completed by Ameren Missouri.

- ARCA – Appliance Recycling Centers of America
- ASHP – Air-source heat pump
- C&I – Commercial and Industrial
- CAC – Central air conditioner
- CFL – Compact fluorescent lamp
- CDD – Cooling degree days
- Deemed Savings – A savings estimate for homogenous measures, in which an assumed average savings across a large number of rebated units is applied
- DLC – Residential direct load control
- ECM – Electronically Commuted Motors
- EFLH – Equivalent full load hour
- EISA – Energy Independence and Security Act of 2007
- EM&V – Evaluation, measurement and verification
- *Ex Ante* – A program parameter or value used by implementers/sponsoring utilities in estimating savings before implementation
- *Ex Ante* Net Savings = *Ex Ante* Gross Savings x *Ex Ante* Free Ridership Rate
- Expected Savings – The saving calculated by the implementation contractor, these numbers are developed prior to the Evaluator's analysis.
- *Ex Post* – A program parameter or value as verified by the Evaluators following completion of the evaluation effort
- *Ex Post* Net Savings = *Ex Post* Gross Savings x *Ex Post* Free Ridership Rate
- FAQ – Frequently asked questions
- Free Ridership – Percentage of participants who would have implemented the same energy efficiency measures in a similar timeframe absent the program.
- Gross Savings – Energy savings as determined through engineering analysis, statistical analysis, and/or on-site verification
- Gross Realization Rate = Ratio of *Ex Post* Gross Savings / *Ex Ante* Gross Savings
- HDD – Heating degree days
- HP – Heat pump
- HVAC – Heating, ventilation, and air conditioning
- ICF – ICF International
- ISR – In-service rate
- kW – Kilowatt
- kWh – Kilowatt-hour
- M&V – Measurement and verification
- MW – Megawatt
- MWh – Megawatt hour
- Net Realization Rate = Ratio of *Ex Post* Net Savings / *Ex Ante* Net Savings
- Net Savings – Gross savings factoring off free-ridership and adding in spillover and market effects.

- NTG – Net-to-gross
- NTGR – Net-to-gross-ratio
- NTGR = (1 – Free Ridership % + Spillover % + Market Effects%), also defined as Net Savings / Gross Savings
- POP – Point-of-purchase
- PCT – Participant Cost Test
- QA – Quality assurance
- QC – Quality control
- ROI – Return on investment
- RR – Realization rate
- RIM – Ratepayer Impact Measure Test
- SCT – Societal Cost Test
- Spillover – Savings generated by a program that are not incentivized
- T&D – Transmission and distribution
- TRC – Total Resource Cost
- TRM – Technical Reference Manual
- UCT – Utility Cost Test
- VFD – Variable Frequency Drive

Executive Summary

As a result of the Missouri Public Service Commission's (PSC) approval of a Stipulation and Agreement[1] in File No. EO-2012-0142, Ameren Missouri launched 11 new demand-side management (DSM) programs in early 2013[2]. Ameren Missouri is required to complete process and impact evaluations[3] to assess the progress of its DSM programs towards meeting the energy savings targets[4] established by the PSC for these programs.

To meet these requirements, Ameren Missouri contracted with two Evaluation, Measurement & Verification (EM&V) contractors: The Cadmus Group, Inc. (Cadmus) and ADM Associates, Inc. (ADM) to conduct comprehensive program evaluations of its energy efficiency portfolio. Cadmus conducted evaluations of the residential energy efficiency programs, while ADM conducted the evaluations of the business energy efficiency programs.

The goal of these evaluations is to comply with the requirements of Section 4 CSR 240-22.070(8):[5]

> *"The purpose of these evaluations shall be to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis" (p. 18).*

In 2012, the PSC contracted with Johnson Consulting Group to serve as its EM&V Auditor[6] (EM&V Auditor Team) to review and comment on compliance with 4 CSR 240-22.070(8) and on the overall quality, scope and accuracy of the Cadmus and ADM EM&V draft and final reports. The EM&V Auditor Team Members' roles and responsibilities are summarized in the following table.

[1] File No. EO-2012-0142, August 1, 2012, Order Approving Unanimous Stipulation and Agreement Resolving Ameren Missouri's MEEIA Filing and Approving Stipulation and Agreement Between Ameren Missouri and Laclede Gas Company.

[2] Note the Home Energy Analysis (HEA) launched on March 1, 2013; the others were launched on January 2, 2013.

[3] 4 CSR 240-20.093(7) and 4 CSR 240-3.163(7).

[4] 4 CSR 240-20.094(3)(A) and Union Electric Company's, MO.P.S.C. Schedule No. 6, Original Sheet Nos. 181.3 and 191.3. Ameren Missouri energy savings targets on Sheet No. 181.3 were adjusted in 2013, 2014 and 2015 to account for opt-out customers.

[5] A more complete citation of the requirements of 4 CSR 240-22.070(8) is in the Introduction section of this Report.

[6] 4 CSR 240-20.093(7) Evaluation, Measurement, and Verification (EM&V) of the Process and Impact of Demand-Side Programs. Each electric utility shall hire an independent contractor to perform and report EM&V of each commission-approved demand-side program in accordance with 4 CSR 240-20.094 Demand-Side Programs. The commission shall hire an independent contractor to audit and report on the work of each utility's independent EM&V contractor.

Table E- 1: Roles and Responsibilities of the EM&V Auditor's Team

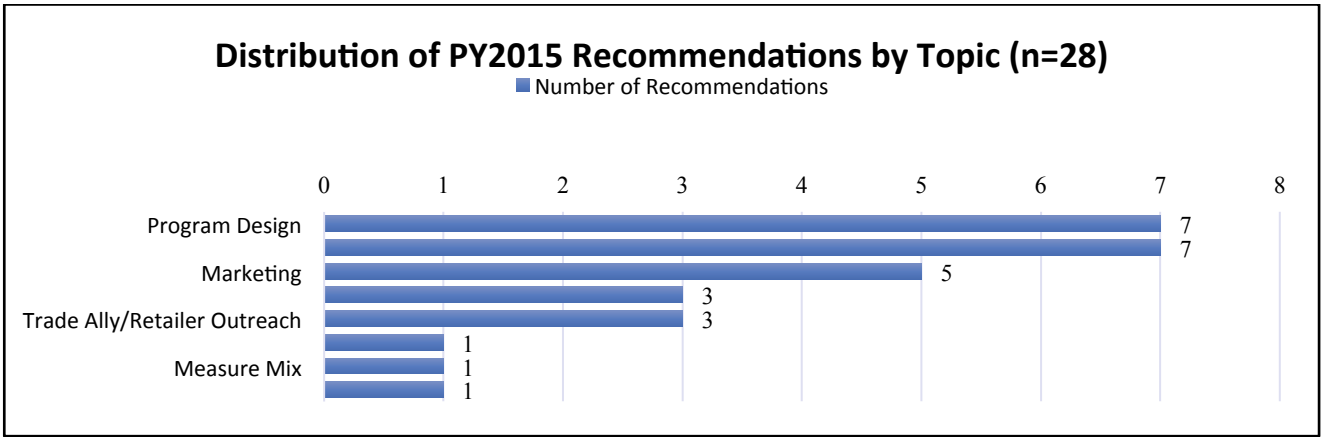
Member	Role	Primary Areas of Responsibility
Dr. Katherine Johnson	Project Manager	Overall Report and Process Evaluations Review and Analysis
Mr. Scott Dimetrosky	Subject Matter Expert: Lighting and Market Effects	Lighting Report Review, Low Income Program Review, Net-to-Gross Review, Statistical Review and Analysis
Dr. Jim Bradford	Subject Matter Expert: M&V Issues and TRM	Lead Review for Impact Evaluations for BizSavers Programs, Heating and Cooling and Home Energy Analysis Programs
Mr. Noah Lieb	Project Analyst	Review and Summarize Cost-Effectiveness Analysis
Mr. Baskar Subbarao	Principle Investigator	Summarize and Analyze Key Findings for BizSavers, Efficient Products and Refrigerator Recycling Programs
Mr. Gregg Eisenberg	Principle Investigator	Assist in review of process evaluations recommendations and editorial oversight

The EM&V Auditor Team completed its review and assessment of these reports in several ways. The Team reviewed each report's draft and final key findings, recommendations, and analytical techniques. Next, the key findings and recommendations were organized by topic areas to identify high-level themes and draw conclusions about the overall progress of the Ameren Missouri's program portfolio.

Based on this review, the EM&V Auditor Team developed both short-term and long-term recommendations on ways to improve the evaluation and reporting processes. This analysis and the recommendations for improvement are based on the EM&V Auditor Team's collective experience with utility energy efficiency programs, EM&V best practices and professional judgment.

EM&V Recommendations

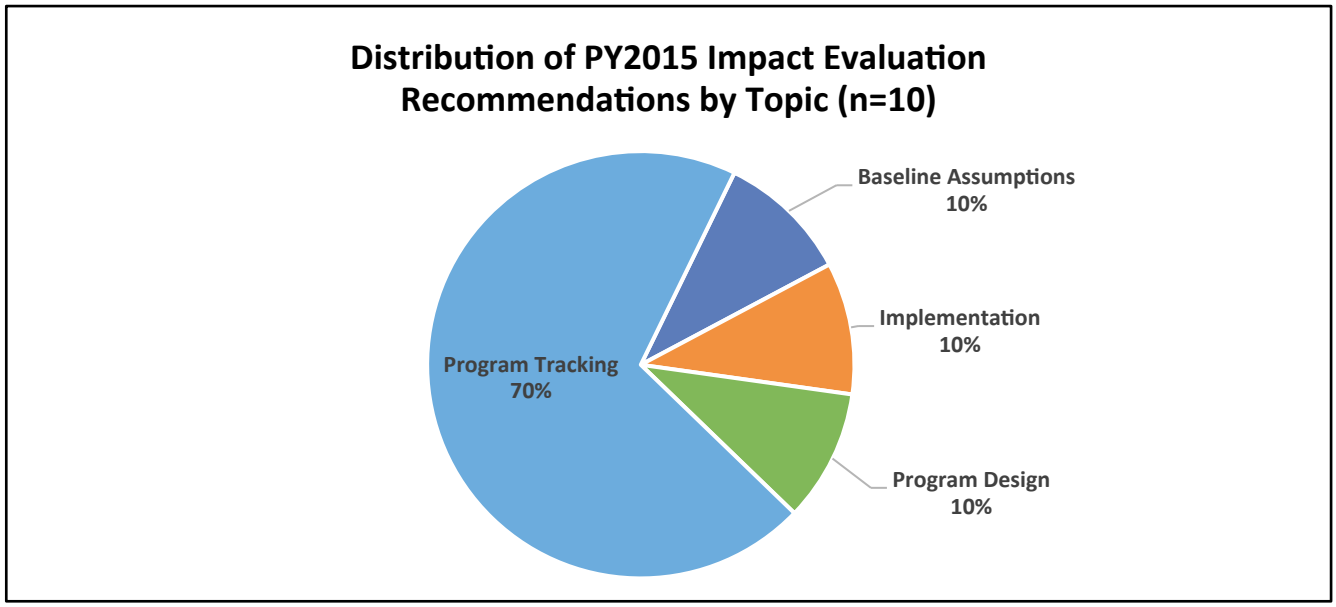
Cadmus and ADM ("Evaluators") provided a total of 28 recommendations on ways in which Ameren Missouri can improve its residential and commercial and industrial (C&I) programs going forward. As Figures E-1— E-3 illustrate, half of the recommendations focused on improving the program design and tracking methods.



(Source: PY2015 EM&V Reports)

Figure E- 1: Distribution of PY2015 Recommendations by Topic

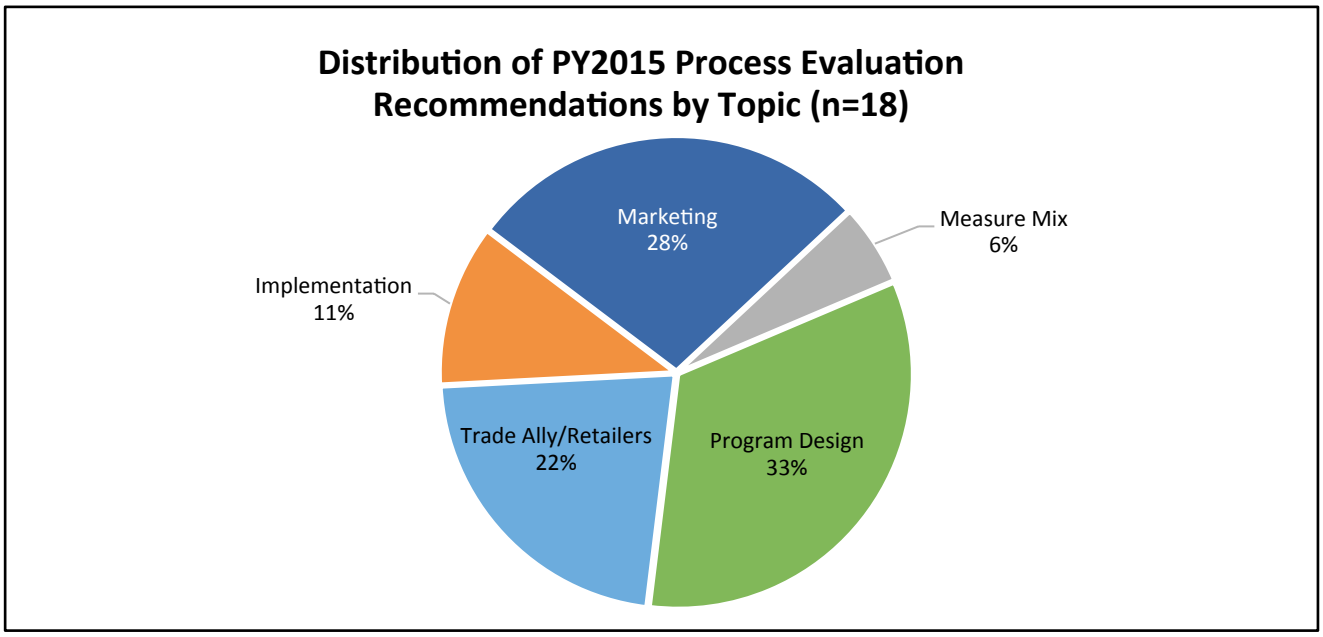
The Evaluators provided a total of 10 recommendations based on the impact evaluations. The majority of these (70%) focused on ways to improve the data tracking procedures, especially for the BizSavers Program as Figure E-2 illustrates.



(Source: PY2015 EM&V Reports)

Figure E- 2: Distribution of PY2015 Impact Evaluation Recommendations by Topic

Similarly, the Evaluators provided a total of 18 recommendations based on the process evaluation findings. These recommendations were fairly evenly distributed across a variety of program areas (see Figure E-3).



(Source: PY2015 EM&V Reports)

Figure E- 3: Distribution of PY2015 Process Evaluation Recommendations by Topic

Recommendations to Improve Current Program Evaluation Reports

After reviewing the draft evaluation reports prepared by The Cadmus Group (Cadmus) and ADM Associates (ADM), the EM&V Auditor Team made, and in some cases, repeated, the following recommendations. Two recommendations were addressed in the Final Report while two recommendations *still* need to be addressed in future reports.

Non-participant spillover estimates may overstate actual effects. This calculation remains problematic, as the EM&V Auditor Team has mentioned in our previous EM&V Auditor Reports. Specifically, the extrapolation of survey responses to the entire population of customers is extremely sensitive to each individual response. For example, there is one respondent who recycled a refrigerator outside of the program, leading to Non Participant Spillover (NPSO) that increased the portfolio savings by about 3.9%, or 5,507 MWh. By comparison this is larger than either the Home Energy Analysis Program and the Low Income Program, and actually equal to about 50 percent of the entire savings from the Refrigerator Recycling Program itself. While the EM&V Auditor agrees that the high cancelation rate (more than 18%) for refrigerator pickup is solid evidence of spillover, the magnitude of the spillover due to the extrapolation method is much greater than the likely magnitude from these cancellations or even general marketing of the program.

Discrepancies between *ex ante* and *ex post* should be more clearly explained. The evaluation reports provide insufficient explanations of the differences between *ex ante* and *ex post* estimates. The Evaluators should explicitly compare savings values and algorithms to those in the TRM or that are otherwise available. For measures that are proprietary, comparison of the Evaluator's methods and generally-accepted engineering practice may be helpful. ADM should also discuss strategies to improve the *ex ante* savings values.

The Evaluator corrected the errors and mistakes in the cost-effectiveness calculations. The EM&V Auditor identified errors that were subsequently corrected in the final report, thus Cadmus effectively addressed this recommendation.

CSR Process Evaluation Requirements: Based on the feedback from the EM&V Auditor, the final process evaluations for the residential programs now include new and relevant information. Therefore, Cadmus successfully addressed this recommendation.

Recommendations to Improve the Future EM&V Reports

The Evaluators should make the following modifications in future EM&V Reports for Ameren Missouri's energy efficiency program portfolio to ensure that these reports comply with accepted industry practices and provide results in a clear and transparent manner.

The non-participant spillover survey and calculations for the residential programs should be updated using a more rigorous approach. The EM&V Auditor Team repeats its concerns raised in the previous two evaluations as the EM&V Auditor Team is not convinced that this approach is appropriate to derive non-participant spillover values. Specifically, the extrapolation of survey responses to the entire population of customers is extremely sensitive to each individual response.

For example, there is one respondent who recycled a refrigerator outside of the program, leading to NPSO that increased the portfolio savings by about 3.9 percent, or 5,507 MWh. By comparison this is larger than either the Home Energy Analysis Program and the Low Income Program, and actually equal to about 50 percent of the entire savings from the Refrigerator Recycling Program itself. Given the volatility of each response, the "burden of proof" for NPSO with this method should be set quite high. For future program evaluations, only those customers who can definitively say they were aware of the programs, gave it high influence, and chose not to participate for a valid reason should be included in the calculations.

The findings from the non-participant surveys should be provided as a standalone appendix in the final report. This recommendation is repeated, as it has been mentioned in both the PY2013 and PY2014 EM&V Auditor's Reports. To reiterate our recommendation, given the importance associated with the findings for non-participant spillover in these evaluations, these findings should be provided in a separate appendix to facilitate understanding and conform to industry best practices for both process and impact evaluations.

Provide additional technical information in the report. When showing confidence and precision values, the Evaluators should explain in greater detail how the findings were calculated and how the information was used. These findings may either be part of a technical appendix or included in footnotes for specific program findings. In any case, these methodologies need to be clearly explained in future reports. This recommendation was raised in the previous EM&V Auditor's Report and has not yet been adequately addressed.

Incorporate the EM&V Auditor's recommendations regarding the evaluation of the upstream lighting and low income programs. In Section 4, the EM&V Auditor provides specific recommendations on ways to more accurately assess the effects of changes in the lighting mix for Ameren Missouri's Lighting Program. The EM&V Auditor also provided some specific guidance on ways to calculate more accurate savings estimates for key measures in the Low Income Program.

Overall Conclusion for PY2015

Overall, the two PY2015 evaluations completed for Ameren Missouri conformed to industry standards and best practices for impact and process evaluations. In particular, the PY2015 EM&V evaluation reports conform to the requirements set forth in the Rider EEIC, and in paragraph 5, b. ii and Appendix B of the 2012 Stipulation and Agreement. The costs and benefits for the annual net shared benefits have been expressed in 2013 dollars. The PY2015 incremental annual *ex post* energy savings are 460,374 MWh and PY2015 annual net shared benefits are $172,035,562 as summarized in Table E-2.

As this is the end of a three-year program cycle, the evaluation reports should compare the results of the portfolio over the three-year plan period, another activity that was curtailed due to budget limitations. Therefore, Ameren Missouri should ensure that future EM&V activities better align with annual spending budgets throughout the three-year program cycle.

However, it was clear that the smaller budget allocated for EM&V activities in PY2015 affected both the scope and the depth of these evaluations. Therefore, critical information such as comparisons to TRM savings estimates and explanations of variances between planned and actual goals were not addressed consistently across all the programs.

Summary of EM&V Results for Cycle 1

The EM&V Auditor Team has reviewed the cost-effectiveness calculations filed by the Evaluators on July 27, 2016 and concurs with those final results. These findings are summarized in Table E-2.

Table E- 2: Summary of Final EM&V Results for Cycle 1

Program Year	Program Costs Nominal $[7]	Program Costs 2013 $	*Ex Post* Gross kWh	*Ex Post* Net kWh	NTG	*Ex Post* Net kW	*Ex Post Net* Benefits
PY 2013 [(1)]	$34,432,402	$34,432,402	390,477,820	347,360,198	88.96%	50,763	$123,646,682
PY 2014	$41,719,606	$38,820,093	345,181,000	360,445,000	95.70%	62,259	$145,925,396
PY 2015	$60,093,722	$52,030,962	460,374,000	460,562,000	99.96%	105,356.5	$172,035,562
Cycle 1 Total	$136,245,729	$125,283,457	1,196,032,820	1,168,367,198	N/A	218,379	$441,607,640

(1) PY 2013 Ex Post Net kWh and Ex Post Net Benefits values are contained in paragraph 11 of the Second Non-Unanimous Stipulation and Agreement Settling the Program Year 2013 Change Requests filed on February 11, 2015 and approved on February 25, 2015 in Case No. EO-2012-0142

Organization of This Report

This report is organized into the following sections to guide the reader through this summary of the key results:

- Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations
- Section 2: Summary of Key Findings and Recommendations from the Process Evaluations
- Section 3: Cost-Effectiveness Findings
- Section 4: EM&V Auditor's Findings and Recommendations

[7] Values were taken from the previous EM&V Reports filed by Cadmus and ADM as follows: Cadmus EM&V Report, Table 4, 6/14/2014; ADM EM&V Report, Table I-5, 6/12/2014; Cadmus EM&V Report, Table 4, 7/29/2016; ADM EM&V Report, Table F-1, 7/29/2016; Cadmus EM&V Report, Table 4, 5/26/2016; ADM EM&V Report, Table N-2, %/16/2016 and Second Quarter 2016 EM&V Report adjusted for 2015.

Introduction

With the passage of the Missouri Energy Efficiency Investment Act in 2009 (MEEIA), the State of Missouri and the stipulated agreement reached with Ameren Missouri and stakeholders signaled a new beginning of energy efficiency program offerings to all customer classes. These programs were launched in January 2013. In accordance with 4 CSR 240-22.070(8), the electric utilities are required to complete process and impact evaluations to assess the progress towards meeting the energy and demand savings targets.

To meet these requirements, Ameren Missouri contracted with two Evaluation, Measurement & Verification (EM&V) contractors, The Cadmus Group, Inc. (Cadmus) and ADM Associates, Inc. (ADM), to conduct comprehensive program evaluations of its energy efficiency portfolio. Cadmus conducted evaluations of the residential energy efficiency programs, while ADM conducted the evaluations of the business energy efficiency programs.

According to 4 CSR 240-22.070(8), the electric utilities are required to complete process and impact evaluations.

> *…The purpose of these evaluations shall be to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis.*
>
> *(A) Process Evaluation. Each demand-side program and demand-side rate that is part of the utility's preferred resource plan shall be subjected to an ongoing evaluation process which addresses at least the following questions about program design.*
>
> *1. What are the primary market imperfections that are common to the target market segment?*
>
> *2. Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?*
>
> *3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?*
>
> *4. Are the communication channels and delivery mechanisms appropriate for the target market segment?*
>
> *5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?*
>
> *(B) Impact Evaluation. The utility shall develop methods of estimating the actual load impacts of each demand-side program and demand-side rate included in the utility's preferred resource plan to a reasonable degree of accuracy.*
>
> *1. Impact evaluation methods. At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:*
>
> *A. Comparisons of pre-adoption and post-adoption loads of program or demand-side rate participants, corrected for the effects of weather and other intertemporal differences; and*
>
> *B. Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same time period.*
>
> *2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:*
>
> *A. Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses; or B. Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.*

(C) The utility shall develop protocols to collect data regarding demand-side program and demand-side rate market potential, participation rates, utility costs, participant costs, and total costs.

In 2012, the Missouri Public Service Commission (PSC) contracted with Johnson Consulting Group to serve as its EM&V Auditor[8] (EM&V Auditor Team) to review and comment on compliance with 4 CSR 240-22.070(8) and on the overall quality, scope and accuracy of these reports.

This review consisted of the following components. The EM&V Auditor Team Members read each program's draft evaluation report in its entirety, and summarized the key findings and recommendations made by program by topic area. Organizing the findings at this level allows for a comprehensive review of the important trends among the programs and identifies issues that are important at both the program and portfolio level. The EM&V Auditor Team Members also made additional recommendations based on the EM&V Auditor Team's collective experience with utility energy efficiency programs' EM&V best practices and professional judgment.

Lastly, the EM&V Auditor Team Members assessed the overall quality of the program evaluations completed by the two contractors: Cadmus and ADM.

This report is organized into the following sections, to help guide the reader through this summary of the key results:

- Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations
- Section 2: Summary of Key Findings and Recommendations from the Process Evaluations
- Section 3: Cost-Effectiveness Findings
- Section 4: EM&V Auditor Team's Findings and Recommendations

To assist the reader, the specific program evaluations are referenced in the text by the program name, year of evaluation and specific page number (i.e., Heating and Cooling Program Report, PY2015, p.1) since all of the reports are for Ameren Missouri for the PY2015. A full list of all reports cited is located in the References Section of this report.

In addition, percentages cited in parenthesis (%) are used to denote particular or significant findings from a particular evaluation report and follow standard industry reporting conventions.

[8] 4 CSR 240-20.093(7) Evaluation, Measurement, and Verification (EM&V) of the Process and Impact of Demand-Side Programs. Each electric utility shall hire an independent contractor to perform and report EM&V of each commission-approved demand-side program in accordance with 4 CSR 240-20.094 Demand-Side Programs. The commission shall hire an independent contractor to audit and report on the work of each utility's independent EM&V contractor.

Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations

Both Cadmus and ADM conducted comprehensive impact evaluations to determine the savings estimates attributable to each program or measure. ***This section summarizes the findings from these impact evaluations,*** while Section 4 provides the EM&V Auditor Team's assessment of the appropriateness of these savings estimates.

The program evaluation duties were divided among the two evaluation firms. Cadmus completed the residential programs evaluations, while ADM conducted the evaluation for the commercial and industrial programs, which is the integrated offering for the commercial and industrial sectors. Table 1 summarizes the types of impact evaluation activities that were completed for Ameren Missouri's energy efficiency program portfolio.

Table 1: Summary of Impact Evaluation Methodologies Used in the EM&V Reports

Program	Measure Verification		Review Program Databases	Verify Correct Use of TRM Values	Estimate gross energy/demand impacts at measure category level	Estimate Net Impacts at a Program Level
	Prescriptive Measure Verification (On-Site/ Surveys)	Custom Measure Verification				
Efficient Products	N/A	N/A	☑	☑	☑	☑
Home Energy Analysis	☑	☑	☑	☑	☑	☑
Heating and Cooling	☑	☑	☑	☑	☑	☑
Lighting	☑	☑	☑	☑	☑	☑
Low Income	☑	☑	☑	☑	☑	☑
Refrigerator Recycling	☑	☑	☑	☑	☑	☑
Custom	☑	☑	☑	☑	☑	☑
Standard	☑		☑	☑	☑	☑
New Construction	☑		☑	☑	☑	☑
Retro-Commissioning (RCx)	☑		☑	☑	☑	☑

(Sources: PY2015 EM&V Reports)

1.1 Summary of Impact Evaluation Findings

Portfolio Level Findings

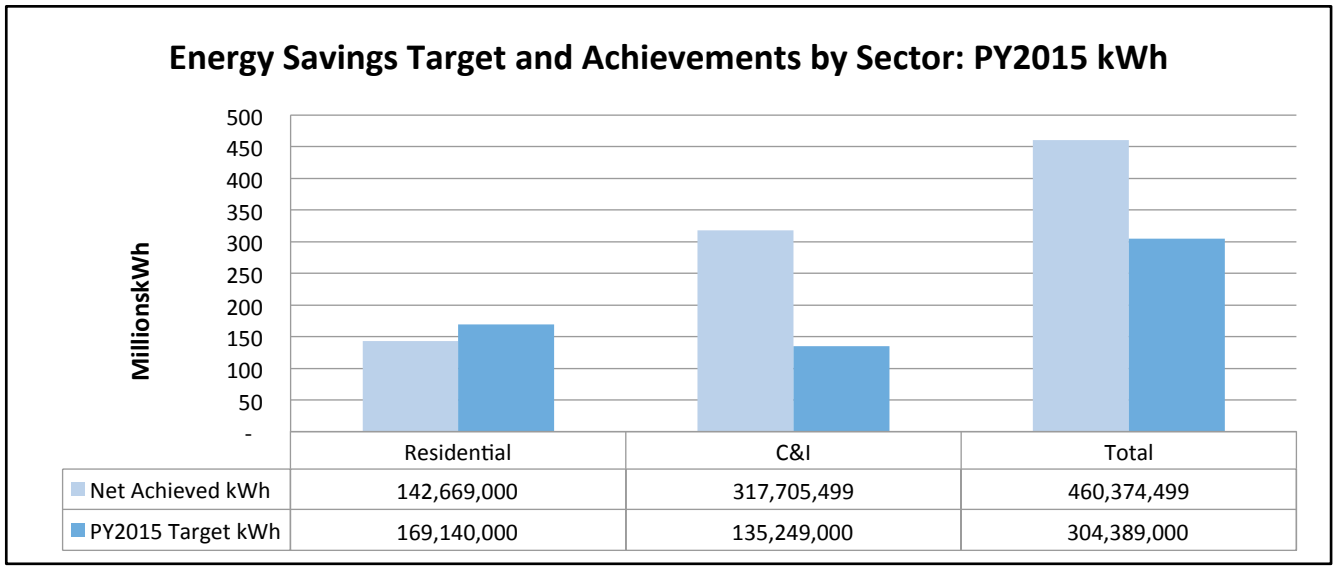
This section summarizes the key energy savings targets and estimates for energy kilowatt-hours (kWh) and demand kilowatts (kW) across Ameren Missouri's energy efficiency program portfolio.

Figures 1 and 2 summarize the energy and demand savings goals and achievements by sector for kWh and kW, respectively, for PY2015 as reported by the Evaluators.

The target savings for PY2015 of 304.3 million kWh and 79.3 MW represent approximately 0.86 percent of the 2015 total annual energy sales as reported in the Ameren 2015 Annual Report (p. 15) and 0.99 percent of the 2015 total system peak demand (Ameren Annual Report, p. 10). The evaluated savings exceeded the targets by

delivering 460.3 million kWh and 106.5 MW, which equates to 1.31 percent of 2015 energy sales and 1.32 percent of the 2015 demand peak.

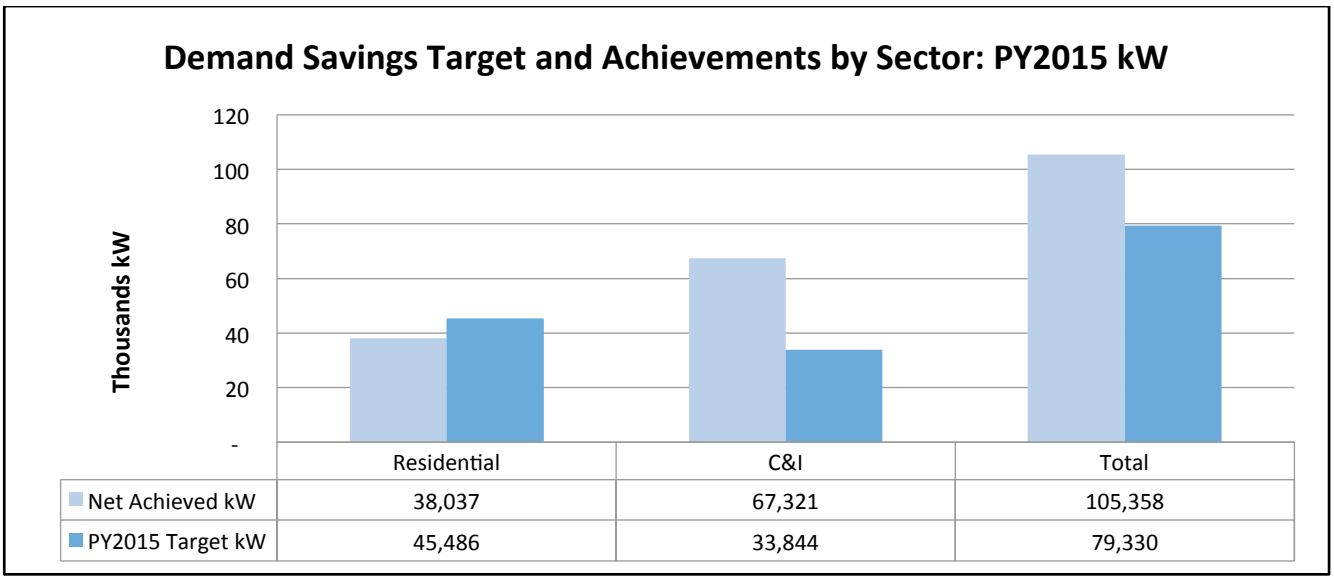
Union Electric Company Missouri (doing business as Ameren Missouri) PSC Schedule 6, Sheet Nos. 181.3 and 191.3 list 2015 targets of 125,303.3 MWh for C&I and 171,957 MWh for Residential, for a total target of 297,260 MWh. The savings values in the PSC Schedules do not match the values cited in the evaluations for either Commercial and Industrial (C&I) or Residential sectors. However, the difference in the energy savings targets is attributed to Ameren Missouri adjusting the targets for actual Opt-Out customers in the C&I sector.[9]



(Sources: Calculated from ADM and Cadmus 2015 EM&V Reports)

Figure 1: Energy Savings Target and Achievements by Sector: PY2015 kWh

[9] Ameren Missouri Memorandum "2013-2015 Ameren Missouri Energy Efficiency MWh Goal Adjustment for Opt Out" dated January 2014.

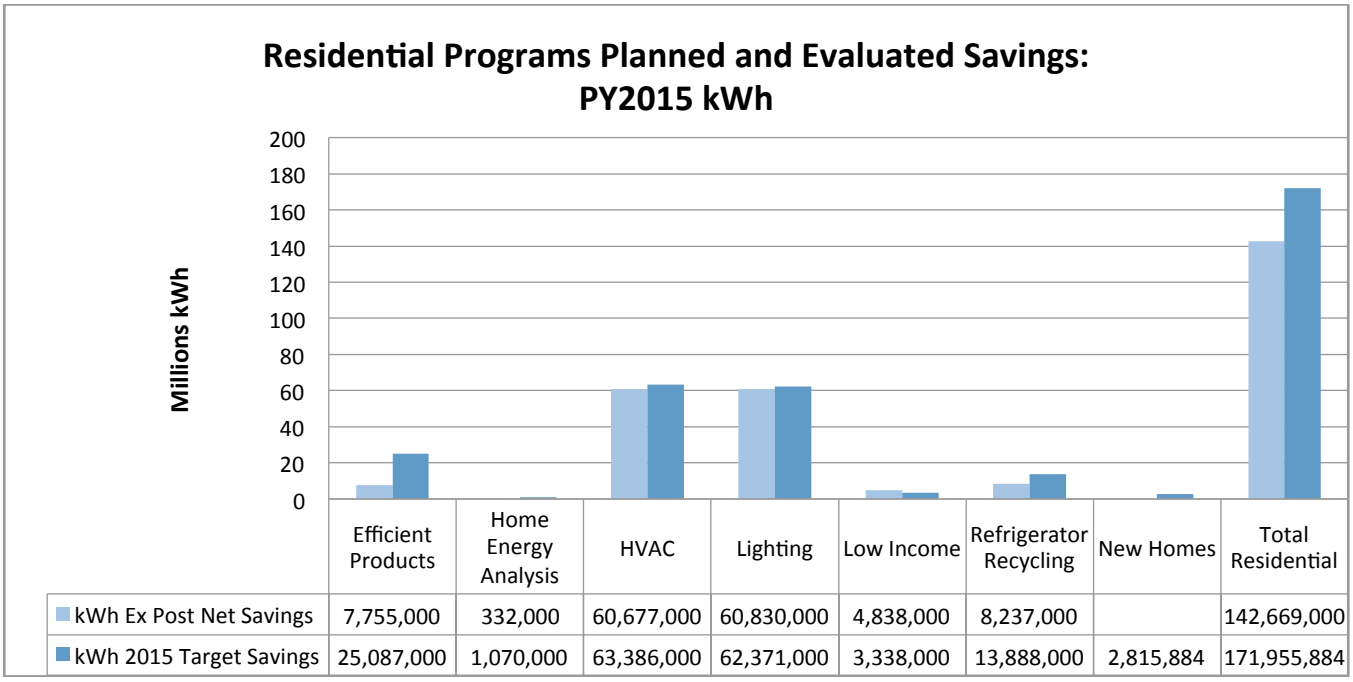


(Sources: Calculated from ADM and Cadmus 2015 EM&V Reports)

Figure 2: Demand Savings Targets and Achievements by Sector: PY2015 kW

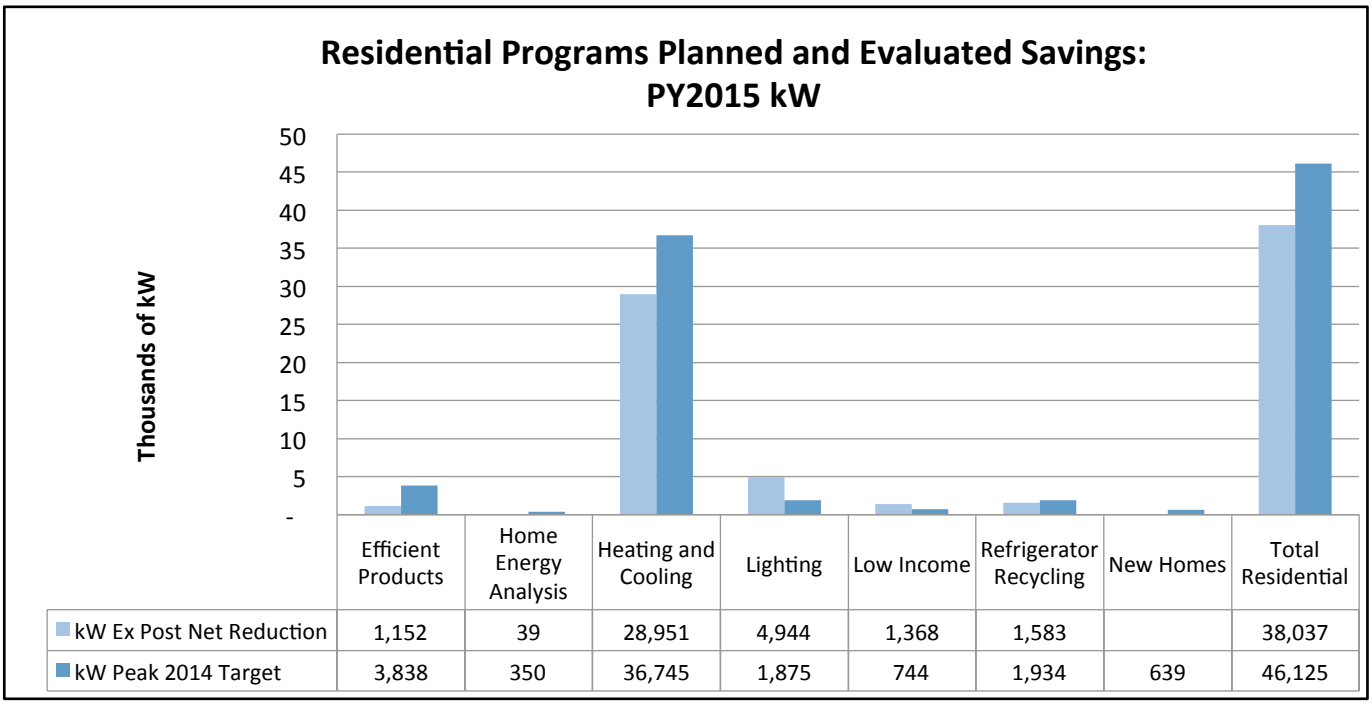
On a portfolio level, the C&I programs significantly exceeded targets, with an evaluated energy saving of 234 percent of target. The residential programs, on the other hand missed their targets reaching 83 percent of the energy savings goal.

Figures 3 and 4 display the key findings for the residential programs while Figures 5 and 6 summarize these findings for the C&I sector on a per program basis.



(Sources: Calculated from ADM and Cadmus 2015 EM&V Reports)

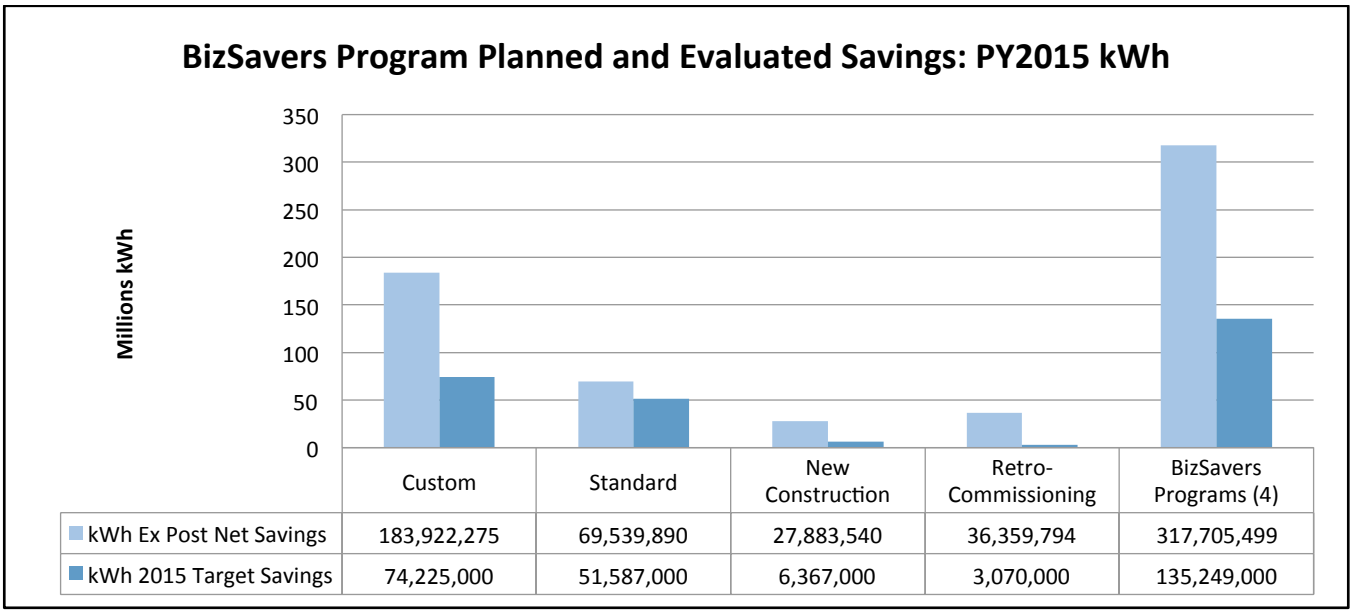
Figure 3: Residential Programs Planned and Evaluated Savings: PY2015 kWh



	Efficient Products	Home Energy Analysis	Heating and Cooling	Lighting	Low Income	Refrigerator Recycling	New Homes	Total Residential
kW Ex Post Net Reduction	1,152	39	28,951	4,944	1,368	1,583		38,037
kW Peak 2014 Target	3,838	350	36,745	1,875	744	1,934	639	46,125

(Sources: Calculated from ADM and Cadmus 2015 EM&V Reports)

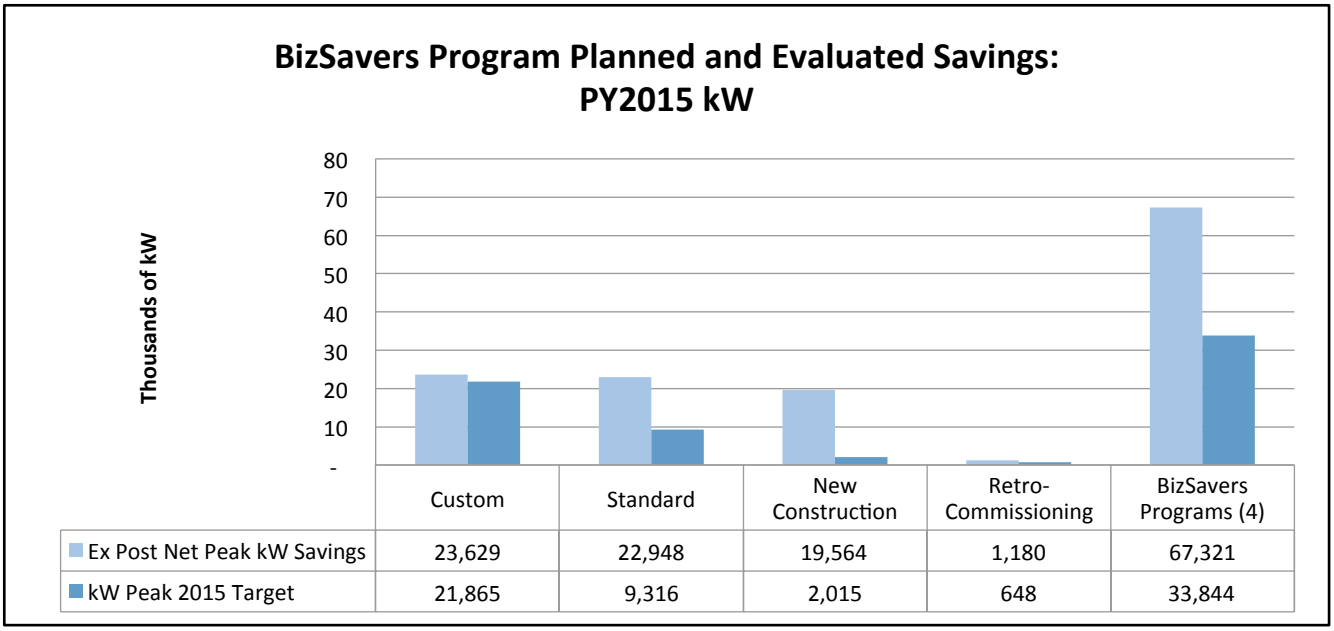
Figure 4: Residential Programs Planned and Evaluated Savings: PY2015 kW



	Custom	Standard	New Construction	Retro-Commissioning	BizSavers Programs (4)
kWh Ex Post Net Savings	183,922,275	69,539,890	27,883,540	36,359,794	317,705,499
kWh 2015 Target Savings	74,225,000	51,587,000	6,367,000	3,070,000	135,249,000

(Sources: Calculated from PY2015 EM&V Reports)

Figure 5: BizSavers Program Planned and Evaluated Savings: PY2015 kWh

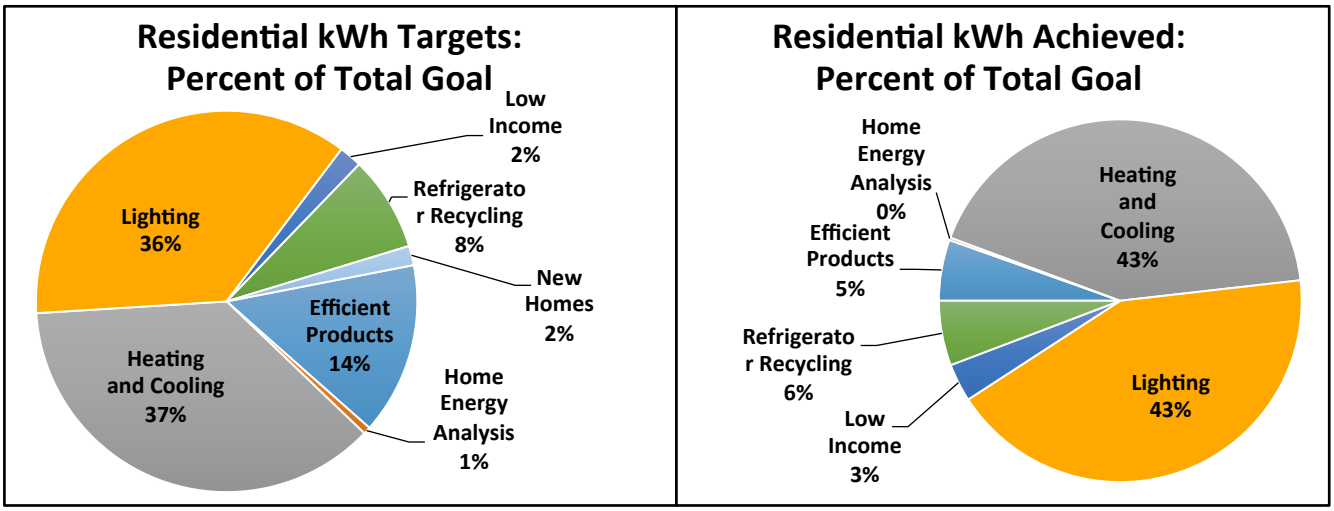


(Source: Calculated from PY2015 EM&V Reports)

Figure 6: BizSavers Program Planned and Evaluated Savings: PY2015 kW

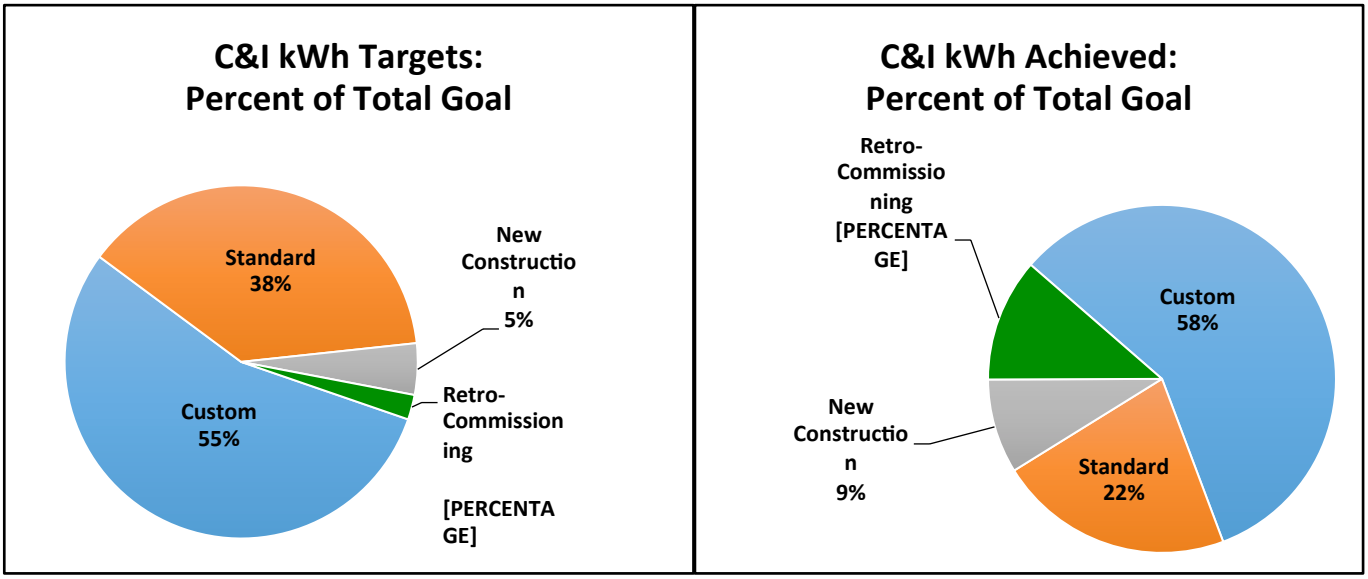
The Lighting Program accounted for 43 percent of the savings in the residential portfolio; however, this was significantly lower than the 75 percent contribution in 2014. The Lighting Program achieved 98 percent of its goal. The Heating and Cooling Program was the next largest contributor for the residential programs providing 43 percent of the savings, compared to a planned savings of 37 percent.

For BizSavers, the Custom Program accounted for the largest percentage (58%) of total savings, which was consistent with its target of 55 percent. and the Standard program was the second largest contributor to savings on the C&I side. The relative targets and savings for each of the programs are compared in Figures 7 and 8.



(Sources: PY2015 EM&V Reports)

Figure 7: Summary of Residential kWh Targets vs. Achieved



(Sources: PY2015 EM&V Reports)

Figure 8: Summary of Commercial & Industrial kWh Targets vs. Achieved

Tables 2 and 3 show the Ameren Missouri's energy efficiency targets, *ex ante* gross values, *ex post* gross values, *ex post* net savings (evaluated) and net achievement compared to the targets for energy savings (kWh) and demand reductions (kW), respectively. To ensure clarity, these terms are defined as follows:

- **PSC-Approved Targets** – Target values are annualized savings targets for the residential and C&I sectors. The annual residential targets are as presented in MO P.S.C. Schedule number 6, sheet number 191.3 effective June 30, 2013.The annual C&I targets are presented in MO P.S.C. Schedule 6, sheet number 181.3 effective June 30, 2013. The C&I annual energy savings targets are modified to account for actual opt-out customers as reflected in the February 22, 2016 filing in File No. EO-2012-0142.
- ***Ex Ante* Gross Savings** – *Ex ante* gross savings are annualized savings either reported by Ameren Missouri, or as calculated by applying tracked program activity to TRM savings values. In the evaluation reports, the *ex ante* gross values are known variously as "expected gross savings," "expected kWh savings," "Ameren Missouri's *ex ante* savings."
- ***Ex Post* Gross Savings** – *Ex post* gross savings are annualized savings as calculated and presented by the Evaluators. In the evaluation report, this is known variously as "Realized Gross kWh Savings," "Achieved Gross Peak," and "Team's Evaluated Savings."
- **Net Savings *Ex Post*** – *Ex post* net savings is the *ex post* savings multiplied by the net-to-gross (NTG) ratio, which accounts for free ridership, spillover effect, and market effects. In the evaluation reports, this was known variably as "Realized Net kWh Savings," and "Achieved Net Peak."

Table 2: Ameren Missouri Portfolio Energy Savings in PY2015, MWh

Program	PSC-Approved Targets	*Ex Ante* Gross Savings	*Ex Post* Gross Savings	Net Savings *Ex Post*	% of Target Achieved	NTG Ratio
Efficient Products	25,087	10,049	7,908	7,755	31%	98%
ENERGY STAR® New Homes	2,816	0	0	0	0	0
Home Energy Analysis	1,070	644	385	332	31%	86%
Heating and Cooling	63,386	58,451	54,622	60,240	95%	110%
Lighting	62,371	77,539	68,326	60,830	98%	89%
Low Income	3,338	4,976	5,050	4,838	145%	96%
Refrigerator Recycling	13,888	9,982	10,774	8,237	59%	76%
Total Residential Portfolio	171,956	161,641	147,065	142,669	83%	97%
BizSavers Custom	74,225	173,413	180,356	183,922	248%	102%
BizSavers Standard	51,587	60,207	66,999,	69, 539	135%	104%
BizSavers New Construction	6,367	29,665	29,192	27,884	438%	96%
BizSavers RCx	3,070	41,015	36,949	36,360	1,184%	98%
Total C&I Portfolio	307,205	304, 300	313,497	317,705	235%	101%
Total	307,205	470,768	473,850	466,804	152%	99%

(Sources: PY2015 Program Evaluation Reports; http://www.ameren.com/-/media/missouri-site/Files/Rates/UECSheet191EEResidential.pdf)

On the residential side, the Low Income program exceeded the MWh goals while the other residential programs did not. The ENERGY STAR® New Home Program was not offered in 2015. Two programs, Energy Efficient Products, and Home Energy Analysis, missed their targets significantly, achieving only about 31 percent of their goals. Refrigerator Recycling only reached 59 percent of its goal (Residential Portfolio Summary Report, PY2015, p. 2).

The C&I results are impressive, with all programs greatly exceeding targets, as Table 3 illustrates.

Note that Table 2 and Table 3 reflect targets including the Residential ENERGY STAR® New Homes program even though it did not operate in 2015. On the Commercial side, the targets presented in Table 3 and Table 4 reflect the values in the evaluation report (BizSavers PY2015, p. 1-3). However, these targets do not precisely match the targets presented in the tariffs or the January Opt out memorandum[8]. The evaluation states "*Ameren Missouri energy savings targets were adjusted to account for opt out customers"* but the EM&V Auditor did not review the documentation making the adjustments reflected in the evaluations.

Table 3: Summary of PSC-Approved Targets for Demand Savings, MW

Program	PSC-Approved Target	*Ex Ante* Gross Saving	*Ex Post* Gross Savings	Net Savings *Ex Post*	% of Target Achieved	*NTG Ratio*
Efficient Products	3,838	1,586	1,162	1,152	30%	99%
ENERGY STAR® New Homes	639	NA	NA	NA	NA	NA
Home Energy Analysis	350	143	45	39	11%	86%
Heating and Cooling	36,745	19,435	26,949	28,951	79%	107%
Lighting	1,875	5,494	5,618	4,944	264%	88%
Low Income	744	724	1,428	1,368	184%	96%
Refrigerator Recycling	1,934	1,298	2,068	1,583	82%	77%
Total Residential Portfolio	46,125	29,431	37,270	38,036	102%	82%
BizSavers Custom	21,865	25,943	22,666	23,824	109%	105%
BizSavers Standard	9,316	14,680	21,723	23,027	247%	106%
BizSavers New Construction	2,015	3,438	10,819	18,539	920%	94%
BizSavers RCx	648	719	1,197	1,665	257%	99%
Total C&I Portfolio	33,844	44,780	66,300	67,055	150%	102%
Total	79,969	74,146	105,494	106,546	133%	101%

(Sources: PY2015 Program Evaluation Reports from ADM and Cadmus, Ameren Missouri Tariff Filings; http://www.ameren.com/-/media/missouri-site/Files/Rates/UECSheet191EEResidential.pdf)

Table 4 summarizes the estimated free ridership, spillover and market effect rates across the entire Ameren Missouri program portfolio. Overall, the NTG ratios range from a low of 77 percent for the Refrigerator Recycling Program to a high of 103.8 percent for the BizSavers Standard Program.

Table 4: Estimated Free Ridership, Spillover Market Effect Rates and NTG for Each Program

Program	*Ex Post* Net MWh Savings	Estimated Free Ridership Rates	Estimated Spillover Rates	Estimated Non-participant Spillover	Estimated Market Effects	NTG Ratio
Efficient Products	7,755	8.9%	3.2%	3.7%	Not Reported	98.1%
Home Energy Analysis	333	16.2%	1.6%	0.9%	Not Reported	86.3%
Heating and Cooling	60,677	11.9%	0.1%	22.9%	Not Reported	111.1%
Lighting	60,830	20.5%	1.2%	3.7%	4.6%	89.0%
Low Income	4,838	4.2%	0.0%	0.0%	0.0%	95.8%
Refrigerator Recycling	8,237	35.3%	0.0%	11.8%	Not Reported	76.9%
New Homes	0	NA	NA	NA	NA	NA
Residential Portfolio	**142,669**	**16.5%**	**0.7%**	**12.2%**	**2.0%**	**98.4%**
BizSavers Custom	183,922	7.8%	2.1%	7.9%	0.0%	102.0%
BizSavers Standard	69,540	5.2%	0.0%	8.8%	0.0%	103.8%
BizSavers New Construction	27,884	10.5%	0.8%	5.1%	0.0%	95.5%
BizSavers Retro-Commissioning	3,636	1.6%	0.0%	0.0%	0.0%	98.4%
Commercial Portfolio	**284,982**	**7.4%**	**1.4%**	**7.7%**	**0.0%**	**101.8%**
Overall Portfolio	**427,651**	**10.4%**	**1.2%**	**9.2%**	**0.7%**	**100.6%**

(Source: PY2015 Evaluation Reports)

Program Level Findings

This summarizes the overall program performance by program.

Efficient Products

In PY2015, the Efficient Products program provided downstream mail-in and online rebates for eight types of qualifying equipment:

- ENERGY STAR®-certified room air conditioners (RACs)
- ENERGY STAR®-certified heat pump water heaters
- ENERGY STAR®-certified air purifiers
- ENERGY STAR®-certified water coolers[10]
- ENERGY STAR®-certified dual-speed pool pumps
- ENERGY STAR®-certified variable-speed pool pumps
- Programmable thermostats[11]
- Electric storage water heaters with an energy factor (EF) of 0.93 or higher[12]

In addition, the Efficient Products program also offered two Home Energy Kit options to customers using electric hot water heaters and who requested the kit after receiving a postcard from Ameren Missouri.

[10] Ameren Missouri did not market water coolers in PY2015 but honored its customers' rebate requests.
[11] Ameren Missouri did not market programmable thermostats but honored its customers' rebate requests.
[12] Ameren Missouri phased out electric storage water heaters in February and March 2015.

Participants who wanted a free kit could order Home Energy Kit 1. Participants interested in receiving an advanced power strip could order Home Energy Kit 2 for $4.95.

The program also provided direct-install kits for multifamily properties. Eligible properties received items from Kit 1, with the expectation that property staff would install the items in each unit. In addition, advanced power strips were also available for purchase at a discounted price through Ameren Missouri's online store (Efficient Products Program, PY2015, p. 3).

As Table 5, shows, the program did not meet its PY2015 energy savings goal of 25,087kWh/year as specified in the Ameren Missouri tariff. The program goals were based on assumed participation levels; so they differ from *ex ante* savings, of which Ameren Missouri achieved 31 percent of its energy savings goal and 30 percent of its demand goal (Efficient Products Program, PY2015, p. 8).

Compared to the PY2014 findings, programmable thermostats in PY2015 exhibited the lowest realization rate (19%). Advanced power strips (29%-35%) and water coolers (39%) also exhibited lower realization rates in PY2015 because of lower estimates of how these products would be used than assumed in the 2012 TRM (Efficient Products Program, PY2015, p. 4).

The program's overall gross savings realization rate increased from 57 percent in PY2014 to 80 percent in PY2015. Furthermore, the Efficient Products program has an overall savings-weighted NTG ratio of 97.9 percent (Efficient Products Program, PY2015, p. 7).

Table 5: Summary of Efficient Products Program

Efficient Products Program	Energy (MWh)	Demand (kW)
Target	25,087	3,838
Ex Ante Gross	10,049	1,586
Ex Post Gross	7,908	1,162
Ex Post Net	7,755	1,152

(Source: Ameren Missouri tariffs and Efficient Products Program Report, PY2015, Table 4)

Heating and Cooling Program

The Heating and Cooling Program offers Ameren Missouri customers living in single-family homes, condominiums, or townhomes incentives for installing high-efficiency central air conditioners (CAC) or heat pumps (HP) through a participating program contractor. The program also offers incentives for Heating and Cooling tune-ups, variable-speed fan motors and programmable thermostats. The Heating and Cooling Program's PY2015 impact results are summarized in Table 6.

Table 6: Summary of Heating and Cooling Program Impact Findings

Heating and Cooling Program	Energy (MWh)	Demand (kW)
Target	63,386	36,745
Ex Ante Gross	58,451	19,435
Ex Post Gross	54,622	26,949
Ex Post Net	60,677	28,951

(Source: Ameren Missouri Tariffs and Heating and Cooling Program PY2015 Report)

To determine the PY2015 program impacts, the Evaluator applied the results from PY2013 engineering analysis and meter study. This approach resulted in a 93.5 percent realization rate compared to the *ex ante* savings calculated by using the assumptions in the Ameren Missouri Technical Reference Manual (TRM). However, the difference in *ex ante* and *ex post* gross savings are not explained in this program evaluation.

The Evaluators determined an overall weighted NTG of 111 percent, which was a significant increase from the 95.4 percent evaluated NTG ratio reported for PY2014 (Heating and Cooling Program, PY2014, p. 3). The Evaluator attributes the improvement in NTG to a two percent reduction in geothermal heat pump free ridership, a 1.2 percent reduction in free ridership for the AC tune ups and a significant increase in non-participant spillover to 17.8 percent. (Heating and Cooling Program, PY2015, p. 3).

Home Energy Analysis (HEA)

Ameren Missouri added the Home Energy Analysis (HEA) pilot program to the residential Act On Energy® portfolio in PY2013. This program seeks to encourage residents of single-family homes to reduce energy consumption by making improvements to the weatherization, lighting, HVAC, and water-heating appliances fueled by natural gas.

The program provides direct install energy-efficient measures at no cost to participants and offers rebates for other measures (i.e., air sealing, ceiling insulation, and energy-efficient windows), referred to in the program as "major measures." Single-family homes receiving electricity and natural gas from Ameren Missouri are eligible to participate. The $25 in-home energy audit and the $25 cost to the customer was eliminated in the second half of the year, resulting in a significant increase in program participation (HEA Report, PY2015, p. 1).

Through the program, Ameren Missouri seeks to achieve energy savings in the following ways:

- Educating customers about their energy consumption via a detailed home energy audit report.
- Installing a range of a low-cost, energy efficiency measures during the home energy audit: CFLs, LEDs, high efficient faucet aerators, high efficient showerheads, and water heater pipe wrap.
- Identifying energy-saving opportunities and recommending major measure improvements to enhance the home's performance (such as infiltration improvements, insulation, and high efficient windows) (HEA Report, PY2015, p. 1).

Table 7 summarizes the impact findings for this program. In addition to the MIEEA electric goals, the Evaluator reports that the program provided a net savings of 33,802 therms (HEA Program, PY2015, p. 3).

Table 7: Summary of Home Energy Analysis Program Impact Findings

Home Energy Analysis	Energy (MWh)	Demand (kW)
Target	1,070	350
Ex Ante Gross	644	143
Ex Post Gross	385	45
Ex Post Net	332	39

(Source: HEA Program, PY2015)

However, the HEA program only provided 31 percent of the planning goal (HEA Program, PY2015, p. 4). The overall gross electric energy realization rate was approximately 60 percent, due to the low realization of CFLs and low flow showerheads (HEA Program, PY2015, p. 3). But the Evaluator noted that realization rate for windows had improved to 46 percent in PY2015 compared to 27.2 percent in PY2014.

The evaluated NTG ratio for the HEA program was 86.3 percent which is similar to the 85 percent reported for the PY2014 program (HEA Program, PY2015, p. 24).

Lighting Program

The Lighting Program's design seeks to increase sales of energy efficient lighting products through a variety of retail channels. Ameren Missouri works with CLEAResult, the Lighting Program implementer, to provide a per-unit discount for eligible CFLs, LEDs, and lighting occupancy sensors.

In addition to reducing prices, CLEAResult leverages its relationships with participating retailers to place discounted lighting products in prominent locations within stores and locate Ameren Missouri signage and marketing materials nearby. Lighting primarily operates through a point-of-sale markdown system at major chain retailers – these bulbs make up 90 percent of the program bulbs. In addition to the markdown channel, the Lighting Program includes two other channels: coupons and social marketing distribution (SMD). The coupon channel (accounting for 0.3% of program bulbs) is available to retailers without a point-of-sale system (i.e., a computer software system that tracks all purchases). Through the SMD channel (accounting for 9.0% of program bulbs, up from 2.6% in 2014), Ameren Missouri distributes free 13W CFLs and 23W CFLs to lower income customers through partnerships with area food banks and related community organizations (Lighting Program, PY2015, p. 1).

The program impacts are summarized in Table 8. Overall, per-unit, *ex post* savings and realization rates increased since last year's evaluation. This increase was the result of an increased in-service rate based on the home inventory study results, decreased leakage, and an increase in the percentage of bulbs going to non-residential applications. These changes more than made up for lower baseline wattages on EISA-impacted bulbs (Lighting Program, PY2015, p. 4).

Ultimately, the evaluation determined that the program achieved 98 percent of its proposed net energy savings target for PY2015 (62,371 MWh) as well as 264 percent of its proposed net demand savings target (1,875 kW) (Lighting Program, PY2015, p. 8).

Table 8: Summary of Lighting Program Impact Findings

Lighting Program	Energy (MWh)	Demand MW)
Target	62,371	1,875
Ex Ante Gross	77,539	5,600
Ex Post Gross	68,326	5.618
Ex Post Net	60,830	4,944

(Source: Lighting Report PY2015)

Low Income Program

The program delivers cost-effective, energy-efficiency services to low-income multifamily properties with three or more dwelling units. The program implementer contracted the direct installation of all energy-efficiency measures (EEMs) to multiple contractors which included the following:

- Lighting (CFLs)
- Insulation of hot water heaters and pipes
- Showerheads and faucet aerators
- Programmable thermostats

Additionally, Ameren Missouri offered replacement of older appliances—such as refrigerators and air conditioners (both room and through-the-wall units) — with ENERGY STAR® models. Ameren Missouri also offered tune-ups for central air conditioning (CAC) systems through the program.

Low Income Program participation requires that property owners and/or managers commit to implementing standard lighting installations in common areas, as applicable, through Ameren Missouri's Business Energy Efficiency Program. This commitment, although nonbinding, bridged Ameren Missouri's residential and commercial program offerings to provide comprehensive, whole-building energy savings in the low income multifamily sector (Low Income PY2015, pp., iv, 1).

Based on the evaluation, the Low Income Program realized 145 percent of its net energy savings target, approved by Missouri Public Service Commission (MPSC), and 184 percent of its demand reduction goal in PY2015 (Low Income PY2015, p. v). These findings are summarized in Table 9.

Table 9: Summary of Low Income Impact Findings

Lighting Program	Energy (MWh)	Demand MW)
Target	3.338	744
Ex Ante Gross	4,976	724
Ex Post Gross	5,050	1,428
Ex Post Net	4,838	1,368

(Source: Low Income Report PY2015)

To determine NTG for PY2015, the Evaluator used the NTG ratio from the PY2013 impact evaluation of 95.8 percent. The Evaluator defined free riders as property managers who would have purchased and installed the measures their tenants received without the program's support. These property managers accounted for some costs but none of the program's benefits, thus decreasing program net savings. Free ridership was estimated using the results of interviews with participating property managers. After applying this free ridership rate, the overall total net savings for the Low Income Program in PY2015 was 4,837.6 MWh (Low Income Program Report, pp. v, 28).

As part of the PY2015 evaluation, the Evaluator quantified the effects of the program on the customers' average monthly bill totals and examined the impacts on the account balances or arrearages that trigger disconnection notice (Low Income Program Report, pp. v, 29). The analysis showed a net decrease in program participants' received bill amount and a decrease in their outstanding balance. Specifically:

- The net average bill amount for program participants decreased by $3.16, or 3.6% relative to the comparison group of non-participants.

- The net outstanding average balance for program participants dropped by 13.8% relative to the comparison group of non-participants (Low Income Report, PY2015, pp. v-vi, 29-32)

Refrigerator Recycling Program

The Refrigerator Recycling program offers Ameren's residential customers a $50 incentive and free pick up service for recycling any operable refrigerator and stand-alone freezer manufactured before 2002 (up to a total of three units per customer per year). With a qualifying refrigerator or freezer, customers may also recycle a working room air conditioner or dehumidifier; however, no incentives are provided for these units. The program is implemented by the Appliance Recycling Centers of America, Inc. (ARCA) (Refrigerator Recycling Program, PY2015, p. 6). Table 10 summarizes these findings.

Table 10: Summary of Refrigerator Recycling Program

Refrigerator Recycling Program	Energy (MWh)	Demand (kW)
Target	13,888	1,934
Ex Ante Gross	9,982	1,298
Ex Post Gross	10,744	2,068
Ex Post Net	8,237	1,583

(Source: Refrigerator Recycling Program, PY2015, Table 5)

The Refrigerator Recycling Program did not meet its target savings goals despite an increase in the number of appliances recycled. In PY2015, the program achieved 59 percent of its proposed savings target from Ameren Missouri's tariff (13,888 MWh). These results are a slight improvement to the PY2014 results, in which the program achieved only 53 percent (6,281 MWh) of its proposed savings target from Ameren Missouri's tariff (11,950 MWh) (p. 5).

During PY2015, the Refrigerator Recycling Program recycled 10,619 appliances, 55 room air conditioners and 114 dehumidifiers. In addition, the scale of the program was considerably larger compared to PY2014 (8,988 appliances) much higher than the program's previous highest collection efforts in PY2011 (9,084 appliances) (Refrigerator Recycling Program, PY2015, pp. 3, 9).

The Refrigeration Recycling Program has a low gross realization rate (71%) for refrigerators and 63 percent for freezers; the program also had a relatively high free ridership (35.3%) (Refrigerator Recycling Program, PY2015, pp. 3, 5).

BizSavers Program

The BizSavers Program is an umbrella program comprised of four programs which include: The Standard incentive program, the Custom program, the Retro-Commissioning (RCx) program, and a New Construction (NC) program. The RCx and NC programs have grown significantly in the past year, but are still small compared to the Standard and Custom offerings. Table 11 summarizes the PY2015 results for BizSavers Programs overall, and Table 11 shows the *ex post* net contribution by program (BizSavers, PY2015, p. 1-3).

Table 11: Summary of BizSavers Overall Impact Findings

BizSavers	Energy (MWh)	Demand, kW
Target	135,249	33,844
Ex Ante Gross	304,299	44,780
Ex Post Gross	313,498	66,300
Ex Post Net	317,706	67,320

(Source: BizSavers PY2015)

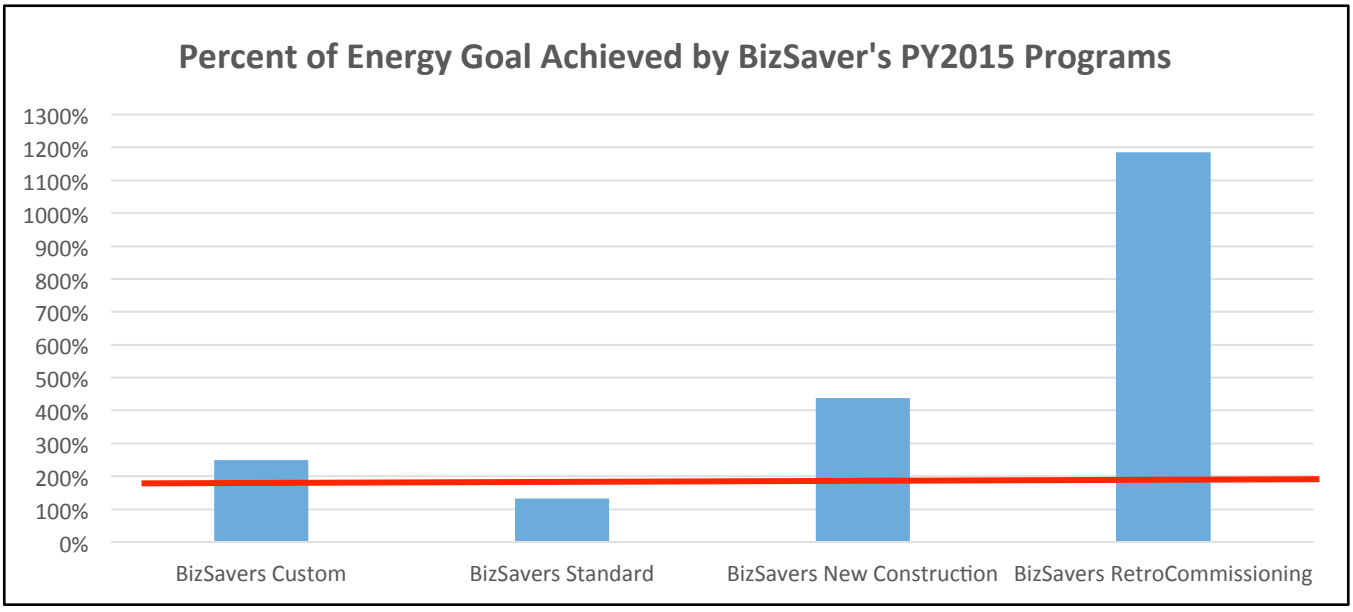
Table 12: BizSaver's Contribution by Program

BizSavers	Energy (MWh)	Demand (kW)
Custom	183,922	23,629
Standard	69,540	22,948
New Construction	27,884	19,564
Retro-Commissioning	36,360	1,180
Total	317,705	67,321

(Source: BizSavers PY2015)

As was the case in 2014, the BizSavers program offerings performed exceptionally well in PY2015. The *ex post* net savings exceeded by an impressive 234 percent of the target energy goals.

As shown in Figure 9, there was a wide variation of savings levels between the programs – for instance the New Construction program delivered more than four times the program targets (BizSavers, PY2015, p. 1-3).



(Source: BizSavers PY2015)

Figure 9: Percent of Energy Goal Achieved by BizSaver's PY2015 Programs

Savings target, *ex ante, ex post* gross and *ex post* net values for each program are summarized in Tables 13 and 14 (BizSavers, PY2015, p. 1-3).

Table 13: Summary of BizSavers Custom Program Impact Findings

Custom Program	Energy (MWh)	Demand, kW
Target	74,225	21,865
Ex Ante Gross	173,413	25,943
Ex Post Gross	180,357	22,662
Ex Post Net	183,923	23,629

(Source: BizSavers PY2015, pp. 1-3-1-5)

Table 14: Summary of BizSavers Standard Program Impact Findings

Standard Program	Energy (MWh)	Demand, kW
Target	51,587	9,316
Ex Ante Gross	60,207	14,680
Ex Post Gross	66,999	21,623
Ex Post Net	69,540	22,947

(Source: BizSavers, PY2015)

Table 15 shows that the New Construction Program savings reported by the Evaluator was nearly five times goal. Additionally, the demand savings calculated by the Evaluator is more than six times the *ex ante* demand savings. Table 16 summarizes the findings from the retro-commissiong program offering which shows the program significantly exceeded its overall goals.

Table 15: Summary of BizSavers New Construction Program Impact Findings

New Construction	Energy (MWh)	Demand, kW
Target	6,367	2,015
Ex Ante Gross	29,665	3,438
Ex Post Gross	29,192	20,819
Ex Post Net	27,884	19,564

(Source: BizSavers PY2015)

Table 16: Summary of BizSavers RCx Program Impact Findings

RCx Program	Energy (MWh)	Demand, kW
Target	3,070	648
Ex Ante Gross	41,015	719
Ex Post Gross	36,949	1,196
Ex Post Net	36,360	1,180

(Source: BizSavers PY2015)

Findings from the TRM Review

Several impact evaluations included an analysis of the gross savings estimates based on a comparison of the TRM values to the savings estimates. In a few cases, the Evaluators found discrepancies when they calculated the gross savings for the Efficient Product measures as the ratio of Ameren Missouri's *ex ante* savings from its 2012 Technical Resource Manual (TRM) and its evaluated (*ex post*) savings.[13] The highest realization rates were for direct-install pipe wrap (324%), dual-speed pool pumps (167%), and heat pump water heaters (159%) which the Evaluators attributed to:

- Longer lengths of pipe wrap installed;
- Differences between ENERGY STAR® pool pump outputs for dual-speed pool pumps compared with 2012 TRM calculations; and
- Higher efficiency levels than assumed for purchased heat pump water heaters (Efficient Products Program, PY2015, p. 4).

In the HEA program evaluation, the analysis on the per unit savings would be improved if the values were more directly compared to the TRM savings estimates. The evaluation identified a significant number of problems with the *ex ante* savings values derived from the TRM. In addition, the URL link to the Missouri TRM is incorrect (HEA Program, PY2015, Appendix E).

1.2 Summary of Key Impact Evaluation Recommendations

The Evaluators provided the following recommendations on ways to improve the impact evaluations in the future. These recommendations have been organized by topic and program.

Baseline Assumptions

The program team should consider adjusting the baseline wattage as well as the lumen equivalence for screw-in general illumination lighting. Federal energy conservation regulations such as the EISA Act of 2007 established baselines for minimally efficient lighting and other equipment (BizSavers, PY2015, p. 1-7).

Implementation

The program implementer should consider revising implementation protocols to improve the accuracy of the measure-level "Unit" data field. The inconsistencies are easily identified as the quantity is often a value of "one" with seemingly high kWh savings (BizSavers, PY2015, p. 1-7).

Program Tracking

The Evaluators provided numerous suggestions on ways to improve overall program tracking, especially for the Lighting and BizSavers programs. These recommendations are summarized next and discussed more fully in the individual evaluation reports

- Future evaluations should not track the presence of incandescent bulbs in the marketplace and instead should adopt the corresponding halogen wattage as the baseline for EISA-impacted bulbs (Lighting Program, PY2015, p. 11).
- The program implementer should consider the costs and benefits associated with collecting additional information for specific program measures including lighting controls and ENERGY STAR® ice machines

[13] Ameren Missouri. *Technical Resource Manual.* 2012.

to improve the overall accuracy of the energy savings impacts, especially for peak demand (BizSavers, PY2015, p. 1-7).

- The program implementer should consider a solution to overcome the technical limitations of LM Captures and its ability to store large digital files (BizSavers, PY2015, p. 1-8).
- Ameren Missouri should consider adding customer type information to its customer database. This additional information would make it easier for programs to identify any under-served segments and improve reach into those segments. It also would improve assessments of program reach to various business and building types (BizSavers, PY2015, p. 1-8).

TRM

The Evaluators also pointed out several ways in which the TRM should be reviewed and updated to better account for 2016–2018 program cycle activity. The assumed parameter inputs for each measure should be reviewed and revised as necessary. Lighting measures especially should be updated to reflect current EISA baseline assumptions. More accurate *ex ante* savings estimates will result in higher realization rates, which ultimately will increase the return on investment for Ameren Missouri's programs (Home Energy Analysis Program, PY2015, pp. 5-7).

Section 2: Summary of Key Findings and Recommendations from the Process Evaluations

This section summarizes the key findings from the process evaluations of Ameren Missouri's energy efficiency program portfolio targeting residential and business customers. It is based on a thorough review of each EM&V report prepared for each program. Note, the residential program evaluations were reported in separate reports for each program while the business program evaluations were summarized in one report. References to each report are provided throughout to aid the reader.

We begin this review by documenting the progress of the previous process evaluation recommendations that were presented in PY2014.

2.1 Summary of Process Evaluation Findings

Status of the 2014 EM&V Recommendations

According to the Evaluators, nearly one-half (47%) of the 32 PY2014 recommendations had been implemented in 2015 while 22 percent were partially implemented. Three percent were being investigated only while nearly one-quarter (28%) had not been implemented (see Figure 10).

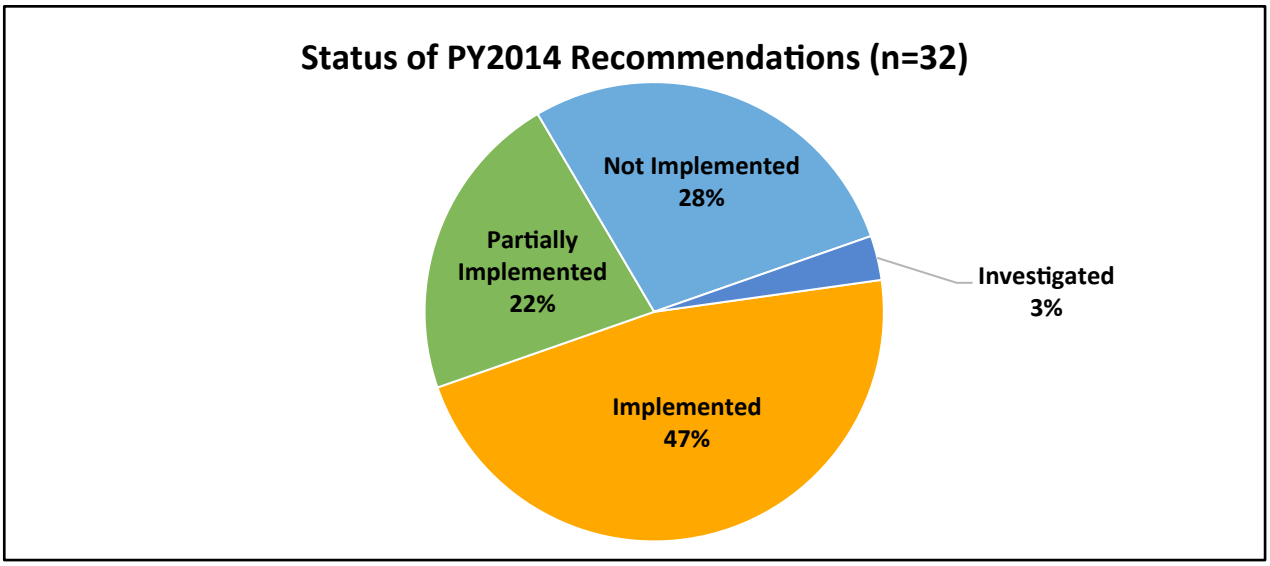


Figure 10: Status of PY2014 Recommendations

Figure 11 summarizes the progress of these recommendations by topic area. As this figure shows, the majority of the recommendations regarding marketing and implementation have either been fully or partially implemented, while three recommendations regarding the program database improvements and one for the TRM values were not implemented.

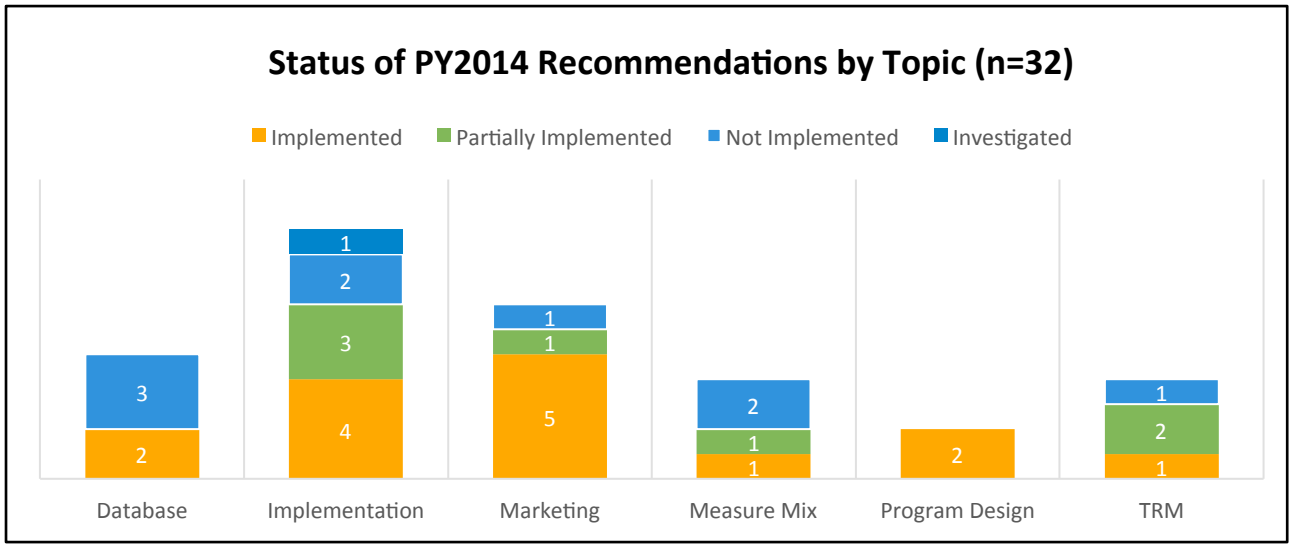


Figure 11: Status of PY2014 Recommendations by Topic

Individual Program Results

Efficient Products Program: The program achieved greater energy savings in PY2015 while maintaining participation levels similar to PY2014, it still fell short of its annual target in 2015 due to differences between the TRM-based deemed savings and evaluated savings values and phase-out of the program. But, the program was able to achieve greater energy savings while maintaining participation levels consistent with PY2014 (Efficient Products Program, PY2015, p. 7)

Two measures were especially successful in PY2015: dual- and multispeed pool pumps. In addition, a large portion of the program's energy savings was attributed to heat pump water heaters and the installation of the kit's measures (Efficient Products Program, PY2015, p. 4).

Heating and Cooling Program: The program's presence positively affected the volume and efficiency of HVAC systems sold in Ameren Missouri's service territory. According to the contractor and distributor sales data, the distribution of 13 SEER units decreased from 2012 to 2015. Contractors reported that 39 percent of 2012 installs were 13 SEER, compared to only nine percent in 2015. Meanwhile, distributors reported a similar drop in 13 SEER units, from 76 percent of all sales in 2012 to only 53 percent in 2015. Moreover, the distributors estimated that their 2016 share of 13 SEER units will increase to 68 percent of all sales (Heating and Cooling Program, PY2015, p. 5).

Home Energy Analysis Program: Overall, the program's growth sustained similar results in PY2015 relative to PY2014, despite losing operational personnel, facing a shortened program timeframe, and drawing from a small eligible participant population. Cumulatively, this program has achieved only 30 percent of its overall three-year goal through the end of its third year (Home Energy Analysis Program, PY2015, p. 4).

Lighting Program: The PY2015 process evaluation focused on the impacts that the market changes had on program operations. Specifically, this included reviewing: incentive changes, distribution channels, increase in LED sales, phase out of incandescent bulbs, stagnation in CFL saturation, and appearance of non-ENERGY STAR® LEDs (Lighting Program, PY2015, pp. 9-10).

Low Income Program: Both Ameren Missouri and Honeywell program staff reported that adding Laclede Gas had a positive program impact by increasing eligibility to customers with natural gas service, thus increasing the program exposure, offsetting costs associated with specific program measures, and ultimately helping customers realize greater energy savings (Low Income Program, PY2015, pp. vi, 7).

In PY2015, Ameren Missouri also developed strong relationships with its program subcontractors, who in turn have a strong understanding of the program operations and processes. The Low Income Program achieved energy savings and demand reductions through the direct installation of cost-effective EEMs in the tenant units of low-income housing within Ameren Missouri's service territory (Low Income Program, PY2015, p. vii).

Refrigerator Recycling Program: The program had difficulty reaching its participation goals despite rebranding and making more effective marketing expenditures. The Evaluators noted that the program continues to increase participation annually, despite its maturity and the continued decline in potential recyclable units (Refrigerator Recycling Program, PY2015, p. 6).

BizSavers Program: Overall, the PY2015 BizSavers program outperformed the previous year; both the number of completed projects and participants increased by 72 percent, the total kWh savings increased 83 percent, the number of buildings increased 56 percent and average kWh savings per project and per participant were over 5,000 kWh higher than the previous year. Participants completed, on average, more projects in 2015 than in 2014, returning close to the number of projects per participant in 2013 (BizSavers, PY2015, p. 5-16).

Program Design

Several evaluations highlighted changes in program design that will need to be addressed in the next program cycle. These findings are summarized next.

The Lighting Program is experiencing several market trends that will make it difficult for the program to operate cost-effectively as currently designed going forward. The product that drove sales in previous years—the standard CFL—will have a lower savings per unit due to the phase-out of incandescent bulbs and a higher free ridership (because regular retail prices have dropped and customers are more familiar with the technology). LEDs have proven popular with customers, and prices are falling, making the bulbs less expensive to promote. However, the increase in non-ENERGY STAR® LEDs will force a program to discount these bulbs more aggressively than it otherwise might. As with CFLs, the lower overall retail price and increased awareness may increase free ridership (Lighting Program, PY2015, p. 11).

The program implementers modified the program design in several ways including changing the distribution channels for the Point of Sale (POS) discounts to mitigate these market effects. But retailers still stocked standard CFLs without program support (Lighting Program, PY2015, p. 29).

The Low Income Program successfully maintained high levels of participation through the program cycle. However, the same market opportunities, such as Low-Income Housing Tax Credit (LIHTC) or Housing and Urban Development (HUD) buildings, may be limited or not available in the future. Ameren may need to expand into different regions and/or customer types in future program cycles (Low Income Program, PY2015, p. vii).

The Evaluators recommended that the Low Income Program's PY2015 measure mix and delivery mechanisms may serve as a template for future program design (Low Income Program, PY2015, p. vii).

Program Participation

To increase program participation in the HEA Program, Ameren Missouri waived the $25 audit fee and lowered the demographic criteria by removing requirements that the program target customers of older age and higher income (Home Energy Analysis Program, PY2015, pp. 5-7).

But the Evaluators noted that program eligibility was potentially constrained due to the program requirements and the implementer reported difficulties in customer recruitment as the program continued into its second and third operating years (Home Energy Analysis Program, PY2015, pp. 5-7).

For the Heating and Cooling Program, installation rates for nearly all measures increased in PY2015. Since Ameren Missouri focused on the benefits of Air Source Heat Pumps (ASHPs), heat pump incentives increased significantly, relative to other measures (Heating and Cooling Program, PY2015, p. 4).

Similarly, the Efficient Products Program had a noticeable increase in program participation for some measures including: pool pumps, air purifiers and ENERGY STAR®-Certified Room Air Conditioners in PY2015 (Efficient Products Program, PY2015, p. 20).

Program staff said the program received more pool pump rebates than had been "considered possible." These increases may be related to changes in retailer stocking patterns and inventory to ensure they have qualifying products and that the measures were available at the start of the program year (Efficient Products Program, PY2015, p.18).

However, the program saw a decline in activity for high-performance water heaters due to reduced product discounts from the manufacturer, which led to lower sales overall (Efficient Products Program, PY2015, p. 20).

While the Low Income Program required participating properties to commit to take part in Ameren Missouri's Business or Residential Rebate program for common area lighting, many properties did not have the means or desire to participate in this portion of Ameren Missouri offerings. Instead, for-profit property management firms in the program (LIHTC properties) engaged in Ameren Missouri's Business program offerings and installing common area lighting (Low Income Program, PY2015, p. 8)

Participation rates also remained strong across the BizSavers Program. The Evaluators identified 1,659 unique participants with completed BizSavers projects that had completed a total of 3,281 projects across 2,395 separately identifiable buildings by the end of Q4 2015. While a majority of participants completed a single project, participants with multiple projects accounted for almost two-thirds (65%) of completed projects in the program (BizSavers, PY2015, p. 5-16).

The BizSavers program also reported solid participation rates for its Retro-Commissioning program. Since 2013, Ameren Missouri customers completed 62 of 73 retro-commissioning projects — an 85 percent completion rate. Of the remaining 11 projects, nine were discontinued and two are on hold (BizSavers, PY 2015, pp. 5-63-5-64).

Similarly, Ameren Missouri customers started 126 New Construction projects since the program began. Of those, 111 are completed, installed, or pending payment — yielding an 88 percent completion rate. Of the remaining 15 projects, six were discontinued and nine are on hold. Of note, more than 70 percent of completed new construction projects occurred in these four sectors and more than 80 percent took more than six months to complete, averaging nearly 15 months from inception to completion (BizSavers, PY2015, p. 5-76).

Program Marketing

Ameren Missouri continued to promote its energy efficiency programs to residential and commercial customers. It most aggressive activities focused on the Heating and Cooling Program in PY2015, allocating more than 50 percent of its entire energy efficiency marketing budget to this program (Heating and Cooling Program, PY2015, p. 4).

The Refrigerator Recycling Program used many of the same marketing strategies as in PY2014 including online advertising, Internet radio ads, traditional radio ads, television ads, and direct mailers to Ameren Missouri customers. The marketing activities focused on clear themes, with less text than in previous years and more emphasis on the rebate and potential energy cost savings. According to the program implementer, the targeted direct mail campaign has been the most successful in generating increased participation in the program (Refrigerator Recycling Program, PY2015, pp. 16-17).

Program marketing in PY2015 for the HEA Program focused on a revised marketing messaging, emphasizing increased customer comfort and reduce energy costs through the installation of major measures (Home Energy Analysis Program, PY2015, p. 4).

Despite this new outreach strategy, the program completed slightly fewer audits (a 5% decrease relative to PY2014). Although the program closed November 30, 2015, it would have met or exceeded the total PY2014 audits had it continued operating through December 2015 (HEA Program, PY2015, p. 4).

The Low Income Program differed from other the Ameren Missouri residential programs, as it targeted eligible property managers rather than residential customers. Therefore, the program relied on primarily on word-of-mouth program promotion between different housing complexes and housing associations to bring new properties into the program (Low Income Program, PY2015, pp. 7-8).

The Evaluators also determined that while the Low Income Program's marketing materials covered measure specifics and usage well, they did effectively address opportunities for households to achieve additional savings through behavioral changes (Low Income Program, PY2015, p. 9)

The Lighting Program's marketing activities focused primarily on changes in the delivery channels rather than the overall marketing messages. The program's emphasis moved away product placement strategies to promote CFLs and instead increased efforts to maximize the visibility of other program measures through product and signage placement. Field representatives were able to introduce some new signage placed in the lighting aisle. However, the traditional placements that drove standard bulb sales were not as widely used for these lower-volume measures (Lighting Program, PY2015, p. 37).

BizSavers staff continued to reach customers and trade allies through a variety of methods including both direct and indirect outreach. New activities in PY2015 included a campaign consisting of quarterly challenges designed to motivate greater activity among trade allies, with the promise of a free banner ad on the BizSavers website, and the aggregation of small accounts with common decision makers into customer "towers" for direct outreach (BizSavers PY2015, p. 5-2).

The program reaches smaller customers through a variety of strategies which include segment-specific outreach targeting trade allies; email blasts, videos, and fact sheets; and direct outreach to contacts for customer associated with specific business segments (BizSavers PY2015, pp. 5-2- 5-3).

Cross Program Promotion: Ameren Missouri also continued its cross-promotion activities in the HEA and Lighting Programs. The Evaluators reported that nine percent of 2014 HEA customers participated in additional

Ameren Missouri residential energy efficiency programs following their home analysis. Similar to PY2014, the participation was mostly concentrated on the Lighting and Heating and Cooling and Lighting Programs, but additional participation was noted by Ameren Missouri within the Efficient Products and Refrigerator Recycling Programs (HEA Program, PY2015, p. 5).

The Lighting Program's marketing activities focused on the personal energy report that the utility distributes to residential customers. Ameren Missouri staff coordinated with CLEAResult to include mention of ongoing sales or special discounts at participating retailers in the personal energy reports, increasing traffic and sales in those stores. These reports were particularly useful in driving sales through the online store.

Trade Ally Outreach: BizSavers hired an Outreach Coordinator, whose responsibilities included recruiting and providing program information to trade allies (BizSavers PY2015, p. 5-2).

Other trade ally outreach activities included efforts to promote the BizSavers Trade Ally Network (TAN) grew to more than 330 members in 2015; new TAN members from the southern and northwestern extremes of the territory reportedly had resulted in more projects from those areas (BizSavers PY2015, pp. 5-2- 5-3).

Program Management

As noted earlier, adding Laclede Gas was as a positive move for the Low Income Program because it increases eligibility to customers with natural gas service, thus increasing the program exposure, offsetting costs associated with specific program measures, and helping customers achieve greater energy savings (Low Income Program, PY2015, p. 7).

CLEAResult continued to implement the Lighting Program with EFI as a subcontractor. There was no turnover in key staff and the CLEAResult team and Ameren Missouri staff have well-established working relationships. The program staff reported that frequent communication occurs and that data sharing and general operation of the program remains excellent. (Lighting Program, PY2015, p. 30).

However, the HEA program experienced significant program management issues including fewer staff, staff turnover and ultimately fewer staff resources (HEA Program, PY2015, p. 4).

Communication and Program Processes

Several program evaluations provided findings regarding the communication processes with the program implementers. For example, the staff working with the BizSavers Program reported that communication both within and between their respective organizations, including between program staff and the Ameren Missouri key account executives (KAEs) and customer support agents (CSAs), remains excellent (BizSavers PY2015, p. 5-8).

Similarly, all stakeholders said communications between Ameren and ARCA were conducted weekly and were effective. Stakeholders also noted that a new e-mail system, informing customers about their incentive's expected arrival date, had reduced questions regarding customer incentives at the call center. (Refrigerator Recycling Program, PY2015, pp. 16-17).

Program Implementation Challenges

The HEA Program experienced significant management changes in both the Honeywell and Ameren Missouri teams which were well documented in the evaluation report. Ameren Missouri reduced its staffing on the program to a single program manager which affected program performance in PY2015. For example, several

program contractors were not paid on time due to slow reporting and/or invoicing by Honeywell (Home Energy Analysis, PY2015, pp. 15-16).

In addition, the program lost two of the four auditors in PY2015 which reintroduced long wait times to receive an audit which increased from two to three weeks after the initial participant request to more than a month after the initial audit request was made. In addition, the program implementer staff reported that waiting lists would also be established for certain regions (HEA Program, PY2015, pp. 16-17).

PY2015 Program Changes

The Evaluators also noted a few program design changes made in PY2015. These included focusing more on the multifamily direct-install delivery channel compared to than the single-family direct-mail channel for the Efficient Products Program (Efficient Products Program, PY2015, p. 19).

As mentioned previously, the Lighting Program experienced significant changes in its measure mix with the complete phase-out of incandescent bulbs. Over the past three years, the program has transitioned away from heavy reliance on big-box stores to including smaller and alternative channels, such as discount retailers (Lighting Program, PY2015, p. 7)

Customer Satisfaction

Overall, the Evaluators reported high customer satisfaction ratings for their residential and commercial program offerings.

For example, the Heating and Cooling Program implementers, managers, and participants were generally satisfied with the program (Heating and Cooling PY2015, p. 5). Participating contractors reported that the new Online Intake Tool significantly improved the process of submitting applications and relaying information. Overall, contractors were satisfied with the application processes for new HVAC installations and the application process for Efficiency Analysis and tune-up service work (Heating and Cooling Program, PY2015, p. 28).

Similar to PY2013 and PY2014, Ameren Missouri and Honeywell program managers reported that program participants positively received the auditors, as demonstrated through high customer satisfaction responses to a survey administered by Honeywell (HEA Program, PY2015, p. 18).

In addition, lighting customers who had experience with LEDS were more satisfied with them than customers who only had experience with CFLs. Overall respondents were satisfied with discounted bulb prices based on the customer feedback for this program (Lighting Program, PY2015, p. 66).

The Refrigerator Recycling Program also received positive customer feedback, according to the program stakeholders. Customers reported high levels of satisfaction with program drivers and staff. The only area of negative feedback centered on issues with the prepaid cards used as incentives. In some cases, these cards could not be used as intended, and customers complained (Refrigerator Recycling Program, PY2015, p. 17).

BizSavers program participants generally were satisfied with the application process and most other aspects of participation, but one-quarter of custom incentive applicants had to resubmit or provide additional supporting documentation (BizSavers PY2015, p. 5-4).

Note that the Efficient Products Program, Low Income and the Refrigerator Recycling Program evaluations did not conduct any formalized customer satisfaction surveys with program participants.

Barriers to Program Participation

For the BizSavers Program, the Evaluators identified some of the challenges in recruiting small businesses. These customers have limited capital, small businesses, and businesses who lease space are least likely to agree to program-qualifying equipment. The service providers were more likely to report low awareness of the BizSavers Program among small businesses than among any other group (BizSavers PY2015, p. 5-5)

Areas for Program Improvement

The Evaluators noted that the HEA Program reporting requirements were particularly burdensome. Particularly, the Honeywell staff noted the difficulty in aligning three separate tracking systems including Ameren Missouri's Vision program database, Applied Energy Group's planning database, and Honeywell's own program database. Additionally, Honeywell indicated the frequency with which Ameren Missouri required reports to be submitted seemed greater than is typical of other utility clients' programs that Honeywell implements. Furthermore, the Ameren Missouri program manager noted that errors or missing data in the reports were common and led to delays in processing program contractor invoices (HEA Program, PY2015, p. 4)

Database collection was a challenge for the BizSavers Program, especially regarding the digital storage of large project documentation files New Construction and RCx projects require the collection and review of many documents by both the program implementer and Evaluator. But the current email gathering system limits the file size and restricts common compression schemes, which add to the overall difficulty of tracking data accurately (BizSavers, PY2015, pp. 1-6-1-7).

The Evaluators also noted other suggestions for program improvements from customers and contractors included: better advertising of the program, larger rebates, and faster rebate processing times (Heating and Cooling Program, PY2015, p. 30).

2.2 Summary of Key Process Evaluation Recommendations

The process evaluations identified 18 recommendations on ways in which Ameren Missouri's energy efficiency portfolio could improve. These recommendations ranged from marketing opportunities to better methods for data tracking, and are organized in this report by topic as a way to summarize the cross-cutting themes.

Program Design

The Evaluators provided a number of recommendations regarding ways to improve current program designs including:

- Change the program eligibility requirements to reach more low income customers (Low Income Program, PY2015, p. vii) or expand the requirements to encourage participation from all Ameren Missouri customers (HEA Program, PY2015, pp. 7-8).
- Adjust the program designs of other residential offerings to offset the diminished savings from the Lighting Program and adapt to changing marketing conditions (Lighting Program, PY2015, pp. 6-7).
- Establish specific milestone savings targets to help keep the HEA Program on track to operate cost-effectively within a predetermined timeframe. (HEA Program, PY2015, p. 7).
- Explore the feasibility of requiring an audit fee balances audit recruitment effects and installations of recommended major measures. Ameren Missouri should determine if a low- to no-fee structure would affect program measure implementation follow-through (HEA Program, PY2015, pp. 5-7).

- Expand the program to Ameren Missouri service territory outside of St. Louis and its suburbs, particularly to small businesses in those areas. The inclusion of free direct install of low-cost measures, to generate immediate cost-effective savings and generate interest in future projects, may help address the fact that small businesses outside of the metropolitan St. Louis area are under-represented in participation (BizSavers, PY2015, p. 1-12).

Marketing

The Evaluators also made several recommendations on ways to improve program marketing including emphasizing targeting marketing to reach niche customer groups and continue to promote cross-program participation.

- Continue to perform targeted marketing as appropriate to reach customers in its programs. For example, the Heating and Cooling Program should continue to target Ameren Missouri customers with high electric energy consumption (Heating and Cooling Program, PY2015, p. 5).
- Targeted marketing should continue to promote program participation in the Refrigerator Recycling Program (Home Energy Analysis, PY2015, p. 7; Refrigerator Recycling Program, PY2015, p.6)
- Cross promotion should also be used to increase promotion of the new construction and retro-commissioning incentives to customers doing standard and custom retrofit projects. These activities may include providing incentives to retrofit contractors who refer customers to the New Construction or Retro-Commissioning Program and targeting customers who have submitted applications for retrofit incentives with direct marketing and outreach that focuses on new construction and retro-commissioning incentives (BizSavers, PY2015, p. 1-12).

Measure Mix

The Evaluators recommended adapting the current measure mix for the Lighting Program as a way to "*create more distinction between CFLs and LEDs."* These distinctions will also enhance the ability to estimate lighting impacts as well (Lighting Program, PY2015, p.11).

Implementation

The Evaluators also continued to encourage Ameren Missouri and its program implementers to build and nurture the relationships it has established with retailers and trade allies during the past three years, as a way to continue to promote program success for its residential and commercial offerings (Heating and Cooling Program, PY2015, p. 5; Lighting Program, PY2015, pp. 9-10; BizSavers, PY2015, p. 1-12).

Section 3: Review of Cost-Effectiveness

As part of the review process, the EM&V Auditor Team reviewed the following aspects of the cost effectiveness analysis:

- Verify the recently revised PY2014 IRP-based avoided costs (per Missouri PSC file number EC-2015-0315) were used for both residential and commercial PY2015 cost effectiveness tests;
- Confirm summary values reported matched the values in the DSMore results file;
- Confirm values reported in aggregate (portfolio-level) matched the sum of the individually reported by program;
- Confirm that the reported costs matched the costs input into the DSMore cost-effectiveness input files (both incentive and overhead);
- Confirm a random selection of measures received appropriate cost-effectiveness input values from the Ameren Missouri TRM (i.e., kWh savings, expected usable life (EUL), incremental cost) [14]; and
- Report current (PY2015) program results and compare against previous year results (PY2014).

As part of this review, the EM&V Auditor Team reviewed all of the residential and commercial summary findings from the portfolio reports and the accompanying DSMore output files. The EM&V Auditor Team was only able to spot check the residential DSMore input or batch files due to the complexity of the commercial inputs. The specific audit tasks and findings are reviewed below.

Verify the recently revised 2014 IRP-based avoided costs (per Missouri PSC file number EC-2015-0315) were used for both residential and commercial PY2015 cost effectiveness tests. The EM&V Auditor Team verified that both Evaluators used the current avoided costs for the cost-effectiveness tests. The new avoided costs resulted in a considerable decrease in the net benefits accrued to the residential programs, while the commercial programs showed considerable increases in net verified savings which offset the decline in avoided costs. The initial draft report for the commercial programs showed some misrepresented program costs, which have since been corrected for the final draft. The Evaluator (ADM) was made aware of the cost issue and worked to resolve it (by entering new cost data and rerunning the cost effectiveness analysis).

Confirm summary values reported matched the values in the DSMore results file. The EM&V Auditor Team did not find any errors between reported and DSMore results file for the residential and commercial programs. The review included cross-checking the five cost effectiveness tests (Utility Cost Test (UCT), Total Resource Cost (TRC), Ratepayer Impact (RIM), Participant Cost Test (PCT), and the Societal Cost Test) and the net lifetime benefits. For the initial draft, the audit team noted the continued lack of reporting of the Societal Cost Test (SCT) in the BizSavers report (though the EM&V Auditor Team did review the results of this test in the DSMore files). The PY2014 EM&V Auditor's Report mentioned the lack of reporting the SCT. The final version of the BizSavers report included the SCT results, therefore this issue has now been properly addressed.

Confirm values reported in aggregate (portfolio-level) matched the sum of the individually reported (by program). The EM&V Auditor Team found only one error in the residential portfolio total relative to the program-based totals. The Refrigerator Recycling Program TRC table program overhead costs were missing the implementation/participation costs of $75,588 (should be a total of $1,870,159, not $1,794,571) (Residential Program Portfolio Report, PY2015, Table 43, p. 23). Note that this issue was merely a reporting error and does

[14] Ameren Missouri, Appendix A – Technical Resource Manual (2012).

not impact the actual calculations nor cost effectiveness and has been corrected for the final draft and no longer remains an issue.

For the BizSavers Programs, the EM&V Auditor Team found numerous examples that showed incorrectly reported (labeled) categories for cost-effectiveness in the initial draft report. The reported cost categories were mixed-up for every BizSavers TRC, RIM, and UCT tables (the PCT tables were not affected). As one example, the portfolio UCT table (incorrectly labeled as TRC calculations within the table headers) shows $9,288,262 in incentives (was listed as "Admin" in DSMore) and $15,766,113 in EM&V, Admin, and Data Tracking costs (was listed as incentives in DSMore) (BizSavers, PY2015, Table N-5, p. N-5). Similar to the residential issues noted above, this issue is merely a reporting error and does not impact the actual calculations nor cost effectiveness. It should be noted that these issues were corrected for the final draft.

Confirm that the reported costs matched the costs input into the DSMore cost effectiveness input files (both incentive and overhead). The EM&V Auditor Team did not find errors in the residential program costs as either input into the report or the DSMore files (apart from the missing costs noted above and since corrected for the final report). The team compared the programs' non-incentive, incentive, and other portfolio-based costs. The BizSavers Program draft EM&V report included a cost table (BizSavers Report, PY2015, Table N-3, p. N-3) that were all PY2014 program costs and not PY2015 program costs, but has since been corrected in the final report. Furthermore, the initial draft costs were labeled incorrectly throughout Appendix N as noted in the preceding issue discussed above (BizSavers, PY2015, pp. N5 – N15). It should also be noted that the Table N-3 discussed here erroneously included "Prescriptive" and "Business – Other" programs in the PY2015 final report. The EM&V Auditor can now verify that these issues have since been corrected to include only the "Standard" program in Table N-3 for the final version of the PY2015 report.

Confirm a random selection of measures received appropriate cost-effectiveness input values from the Ameren Missouri TRM. The EM&V Auditor Team focused on the lighting and efficient products programs to validate the appropriate use of TRM-based assumptions were applied to a random selection of measures. The EM&V Auditor Team did not find discrepancies for the residential nor commercial programs.

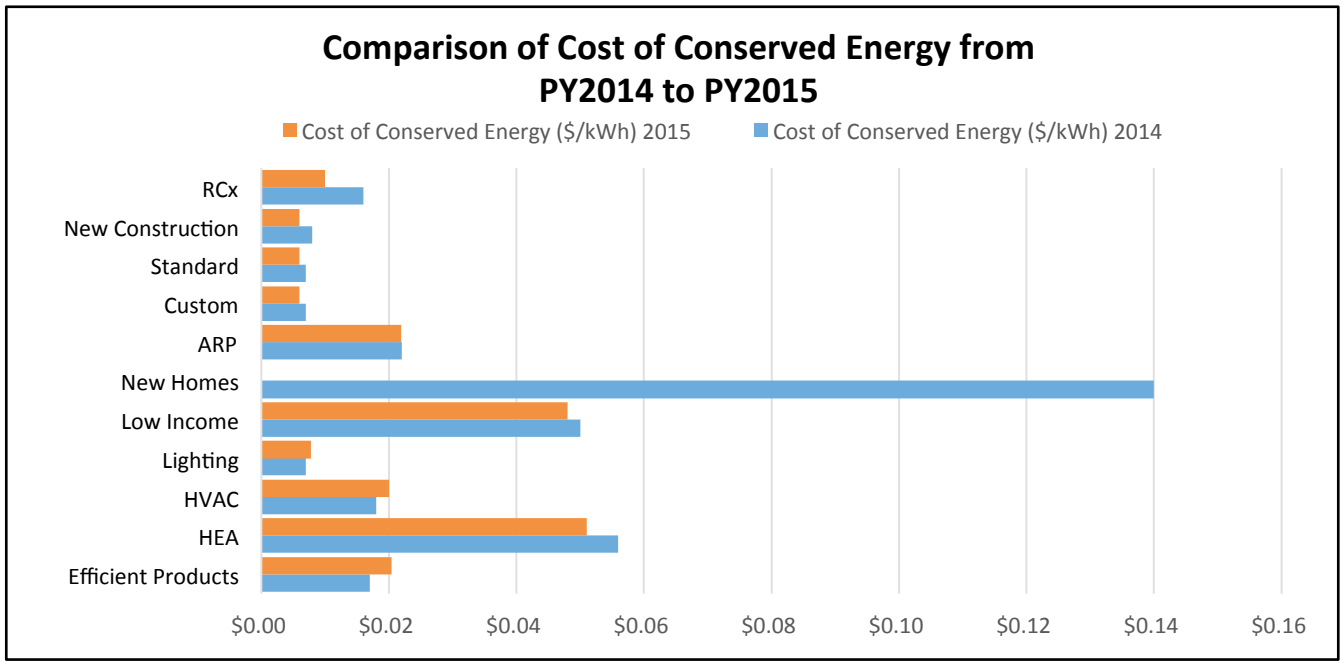
Report current (PY2015) program results and compare against previous year results (PY2014). As Table 17 and Figure 12 show, the BizSavers Programs had low Cost of Conserved energy (CCE) - all less than $0.01 per kWh, and showed a decrease relative to the PY2014 program results. The residential lighting program showed the lowest cost of conserved energy across the residential programs at $0.008 per kWh, while the remaining residential programs' cost of conserved energy were relatively unchanged in PY2015 relative to PY2014. It should be noted the continued reduction in cost of conserved energy ($/kWh) for the Retro-Commissioning Program (second year in a row with significant reduction) - this is particularly evident in Figure 12.

Table 17: Comparison of 2014 and 2015 Cost of Conserved Energy ($/kWh)

Program	Cost of Conserved Energy ($/kWh) 2014	Cost of Conserved Energy ($/kWh) 2015
Efficient Products	$0.017	$0.020
Home Energy Analysis	$0.056	$0.051
Heating and Cooling	$0.018	$0.020
Lighting	$0.007	$0.008
Low Income	$0.050	$0.048
New Homes	$0.140	N/A
Appliance Recycling (ARP)	$0.022	$0.022
Custom	$0.007	$0.006
Standard	$0.007	$0.006
New Construction	$0.008	$0.006
Retro-Commissioning	$0.016	$0.01

(Sources: PY2014 and 2015 Ameren Missouri Program Evaluation Reports)

Figure 12 reflects the continued reduction in cost of conserved energy ($/kWh) for the Retro-Commissioning Program.



(Sources: PY2014 and 2015 Ameren Missouri Program Evaluation Reports)

Figure 12: Comparison of Cost of Conserved Energy from PY2014 to PY2015

Table 18 summarizes the total net lifetime benefits from these programs as reported by the PY2015 EM&V reports and compares the current (PY2015) net benefits to previously reported PY2014 net benefits totals. Every residential program showed a decrease in the total net benefits, with one of the six 2015 residential programs that were cost effective (positive net benefits) in PY2014 now no longer cost effective (negative net benefits) (i.e., Low Income).

Table 18: Net Lifetime Benefits (in dollars) per Program

Program	Net Lifetime Benefits (Reported) 2014	Net Lifetime Benefits (Reported) 2015
Efficient Products	$2,598,618	$1,051,330
Home Energy Analysis	($53,125)	($51,503)
Heating and Cooling	$42,348,793	$13,292,564
Lighting	$42,085,347	$14,594,132
Low Income	$478,543	($337,746)
New Homes	($131,965)	N/A
Appliance Recycling	$1,827,139	$1,098,929
Custom	$55,152,500	$98,507,036
Standard	$24,034,160	$18,713,713
New Construction	$9,096,053	$19,087,827
Retro-Commissioning	$5,387,214	$34,372,899
Total	$182,823,277	$200,329,181

(Sources: 2014 and 2015 Evaluation Reports from Cadmus & ADM)

Two residential programs were not deemed cost effective over the life of the program: The HEA and the Low Income Programs. While the majority (62%) of the net benefits were derived from residential programs in PY2014, commercial programs were the overwhelming source of net benefits in PY2015 (accounting for 85%). The PY2015 results show the Custom, Standard, and Retro-Commissioning BizSavers Programs have the largest net benefits in the portfolio.

Table 19 summarizes the cost-benefit analysis from the five standard economic cost-effectiveness tests. The non-cost-effective results are highlighted in red below.

Table 19: Program Cost-Effectiveness Test Results

Program	UCT	TRC	RIM	PCT	SCT
Efficient Products	1.58	1.05	0.39	1.25	3.36
Home Energy Analysis	0.74	0.55	0.32	0.70	1.91
Heating and Cooling	2.19	1.05	0.46	1.20	2.64
Lighting	3.49	1.27	0.42	1.66	3.02
Low Income	0.88	0.88	0.37	1.03	N/A
New Homes	N/A	N/A	N/A	N/A	N/A
Appliance Recycling	1.60	1.60	0.43	1.37	N/A
Custom	6.20	1.47	0.60	2.46	1.76
Standard	6.00	1.48	0.57	2.77	1.79
New Construction	7.21	5.20	0.68	9.87	6.25
Retro-Commissioning	4.66	4.70	0.67	11.55	5.23

(Sources: 2015 Evaluation Reports from Cadmus & ADM)

Section 4: EM&V Auditor Findings and Recommendations

The EM&V Auditor Team reviewed the program evaluation methodologies used in Section 4.1 followed by a summary of the ways in which these program evaluations met the specific 4 CSR 240-22.070(8) Requirements in Section 4.2.

4.1 Evaluation Methodologies

Table 20 summarizes the methodologies used for the residential program evaluations while Table 21 summarizes the approaches used for the BizSavers program evaluations.

Table 20: Summary of Residential Program Evaluation Methodologies

Activity	Efficient Products	Home Energy Analysis	Heating and Cooling	Lighting	Low Income	Refrigerator Recycling
Review the Data Tracking	☑	☑	☑	☑		
Interview Program Staff/Implementers	☑	☑	☑	☑	☑	☑
Survey Participants			☑	☑		
Survey Participating Trade Allies			☑			
Analyze Gross and Net Impacts	☑	☑	☑	☑		☑
Analyze Cost-Effectiveness	☑	☑	☑	☑	☑	☑
Conduct Metering Study			☑			
Conduct Site Visits						
Site Visits and Metering						
Conduct an Engineering Analysis					☑	
Conduct Store Intercepts				☑		
Conduct Leakage Analysis				☑		
Conduct In-Service Rate Analysis				☑		
Conduct Demand Elasticity Modeling				☑		

(Source: Residential Evaluation Reports, PY2015)

Table 21: Summary of Data Collection Activities for the BizSavers Program Evaluation

Data Source*	Method	Dates	Research Objective	Analysis Type
Pre-install site visit (8)	On-site M&V	January to December 2015	Verify baseline operating conditions	Qualitative
Post-install site visit (78)	On-site M&V	January to December 2015	Verify measure installation and collect end-use metering data	Qualitative
Program staff (7), Ameren Missouri (2), Lockheed Martin (5)	In-depth interview	September to December 2015	Program function; communication; tracking and reporting; quality control	Qualitative
Program documentation	Document review	January to December 2015	Program function; tracking and reporting; quality control	Qualitative
Database analysis	Database review	January 2015	Number of projects; project type and details; data quality	Quantitative
Participants, Standard and Custom programs (843)	Online survey	March 2015 to January 2016	Program experiences; installed equipment; satisfaction with program	Quantitative
Participants, New Construction and Retro-Commissioning programs (12)	In-depth Interview	November to December 2015	Program experiences; installed equipment; satisfaction with program	Qualitative
Near-participants, Standard and Custom programs (10)	In-depth Interview	November 2015	Program awareness; reason for program withdrawal; other energy efficiency activities; satisfaction with program	Qualitative
Trade allies and non-allied service providers (57)	Telephone survey	September to October 2015	Program awareness, energy decision-making, upgrades to energy-using equipment, barriers to participating in program, and interest in Ameren Missouri programs	Quantitative and qualitative
Retro-Commissioning service providers (4) and NC trade allies (5)	In-depth Interview	October to November 2015		
Event attendees (7 attendees)	Online survey	May to October 2015	Event satisfaction; experience with training; Intention to work with BizSavers; firmographics	Quantitative and qualitative
Economic and Financial Assumption, 2015 Ameren Program Expenditures	Cost-Effectiveness Analysis	January 2016	Develop economic models for cost testing	Quantitative
DS More Batch Tools	Cost-Effectiveness Analysis	January 2016	Develop measure level EUL and incremental costs	Quantitative
Aggregation Results	Cost-Effectiveness Analysis	January 2016	Summarize program level costs and benefits, detailing each cost test input	Quantitative

(Source: BizSavers PY2015, pp. 1-2-1-3)

Concerns Regarding Methodologies and Evaluation Resources

The scope of the program evaluations activities was severely curtailed in PY2015. Based upon our comparison of the methodologies used in PY2015 compared to previous years, the scope of both the process and impact evaluations were limited. While some activities do not need to be repeated every year, such as participant or non- participant surveys, several program activities should have been completed each year but were not. These activities include:

- Comparing the assumptions used in the impact evaluations to the TRM values, and
- Reviewing the marketing and outreach materials.

These research limitations were addressed in only one report, as a way to explain the reasons for not completing a participant survey. "*Due to the long term program stability and limited evaluation resources, the Cadmus team did not conduct an extensive process evaluation in PY2015*" (Refrigerator Recycling Program, PY2015, p. 6).

However, the significant challenges and personnel changes in the HEA program should have triggered a more in-depth process evaluation, including a participant survey.

> *"Overall, the program's growth sustained similar, albeit lower, performance in 2015 relative to PY2014, despite losing operation personnel, facing a shortened program timeframe, and drawing from a small eligible participant population, relative to Ameren Missouri's other residential programs. The program, however, achieved just 31% of its total program savings goal for PY2015, and it cumulatively achieved only 30% of its overall three-year goal through the end of its third years.* (HEA Program, PY2015, p.4)

But the Evaluators noted that the that they did not conduct participant surveys in PY2015, and instead relied on the previous results to determine measure persistence, free ridership rates and spillover (HEA Program, PY2015, p. 11), despite the changes in both program operations delivery. This information should have been updated in PY2015.

We found similar patterns of reduced resources for process evaluations for the Low Income Program also despite significant changes in program personnel (Low Income Program, PY2015, p. vi). Similarly, the Evaluators reported that they did not conduct participant telephone surveys for the Efficient Products Program since there were no changes in the program delivery in PY2015. Instead, the team applied installation rates from the most recent evaluation results (Efficient Products Program, PY2015, p. 15). But changes in the kit designs and implementation strategies should have also triggered a more in-depth process evaluation that included participant surveys to update installation rates as well.

Process evaluation best practices require that participant surveys should be completed when there is a change in the program implementer, program design or if the programs are experiencing significant implementation challenges.[15] These factors were all evident for the Efficient Products, HEA, and Low Income Programs.

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[15] *Protocol C, Arkansas Technical Reference Manual, Volume 1, August 31, 2015* and *New York State Process Evaluation Protocols, A Supplement to the New York State Evaluation Guidelines Updated 2012*.

An analysis of the variances in the EM&V budgets for the three-year cycle further demonstrated that most of the EM&V budgets were spent on the first-year. In fact, Ameren Missouri spent more than $1,000,000 in the first year of the program cycle meaning that Evaluators had significantly had lower budgets to work with to complete the same set of tasks in the remaining two years. In addition, they spent nearly $300,000 less on EM&V in the fourth quarter this year, compared to the same period last year.

Going forward, Ameren Missouri needs to ensure that budgets are spent more evenly and consistently during the next three-year period to ensure that sufficient resources are available during the third and final year of the program cycle, to provide the valuable true-up and comparisons across program years. Since these programs are operated in three-year cycles, all final reports should contain summaries of the total portfolio performance during the course of the three-year cycle, as a way to better inform program design going into the next program cycle.

EM&V Auditor's Assessments of the Program Evaluations

As a result of our review of the PY2015 impact evaluations, the EM&V Auditor Team has identified several areas of concern that highlighted in our draft report. However, these issues were still not satisfactorily addressed in the final evaluation reports, and therefore should definitely be incorporated in future EM&V activities for Ameren Missouri's programs.

Non-Participant Spillover (Across Programs)

As the team identified in the PY2014 EM&V Auditor's Report, we still have concerns about the ways in which Non-Participant Spillover (NPSO) was calculated. By extrapolating the findings from a few respondents across the entire population of non-participating residential customers, the analysis is quite sensitive to each individual response.

In particular, there is one respondent who recycled a refrigerator outside of the program. To clarify the magnitude of this response, this one respondent represents approximately half of the NPSO. Given an estimated NPSO of 8.6 percent, this response bumped up the entire portfolio savings by about 3.9 percent, or 5,507 MWh. By comparison this is larger than either the Home Energy Analysis Program and the Low Income Program, and actually equal to about 50 percent of the entire savings from the Refrigerator Recycling Program itself, and about 70 percent of the savings from the entire Efficient Products Program. In addition, Cadmus was unable to complete the interview with this single respondent as to why they did not participate in the program.

The final report did address some of the auditor's earlier comments (e.g., noting the savings was adjusted for partial use), plus the report noted that over 18% of the customers that sign up for recycling cancel the pickup, possibly due to difficulty scheduling or perceived opportunity to earn more money for parts. While the auditor agrees this is evidence of spillover, even if every one of these customers were 100 percent spillover the total direct spillover from the Refrigerator Recycling Program would only be 18 percent of the total program gross savings, or about 1,939 MWh, or only about one-third of the spillover that was claimed via the current method. While there may be additional spillover due to customer education, it seems unlikely the magnitude of this is three-times the number of customers that signed up but canceled the pickup.

Given the volatility of each response, the "burden of proof" for NPSO with this method should be set quite high. For future program evaluations, only those customers that can definitively say they were aware of the programs, gave it high influence, but chose not to participate for a valid reason should be included in the calculations.

Lighting Program

The EM&V Auditor Team also raised several concerns in our draft report regarding the gross and net savings calculations used to determine savings for the Lighting Program in PY2015. As discussed below, these were resolved in the final Lighting Program evaluation report.

Gross Savings

- ***Cross-sector Sales***: The draft report proposed value of 15 percent of upstream lighting sales to commercial customers would have been one of the highest cross-sector sales values in the U.S., according to a recent cross-sector sales benchmarking study conducted by Cadmus.[16] This value, however, was only based on prior research of cross-sector sales in big-box stores, and the draft Lighting Program evaluation report noted that "*PY2013 to PY2015 made the transition from heavy reliance on big-box stores to greater inclusion of smaller and alternative channels, such as discount retailers."* Cadmus revised the cross-sector sales value by assuming 15 percent commercial sales only for the program big-box sales, and then using a value 6.6% based on the benchmarked average from programs around the country. The combined weighted average of 9.8% was well within the range of similar programs across the country.
- ***Delta watts/Reflectors***: The original analysis did not address reflector and specialty (EISA exempt) baselines, plus was difficult to follow. The revised Upstream Lighting report added in delta watts for these bulb types, and clarified the use of a weighted baseline (based on availability) for general service lamps sold in the big-box channels.
- ***In-Service Rate (ISR):*** The draft Upstream Lighting Program report assumed an installation rate of 100%. The most recent Uniform Methods Project (UMP), however, caps the ISR at 97 percent, plus suggests discounting the ISR to reflect future bulb installations. Cadmus revised the analysis to reflect these recommendations. There is another reason for this decrement as well: given the move away from CFLs towards LEDs, a higher percentage of the program CFLs may not get installed now as customers purchase LEDs and use those in lieu of the CFLs.

Net Savings

- ***Lighting Spillover and Market Effects***: For PY2014 the lighting spillover and market effects were set at one-half of the value from PY2013, with the stated assumption they would be trued up in 2015 (*from the prior year report: "The Cadmus team will verify lighting saturation in the PY2015 home inventory study, adjusting PY2015 market effects estimate to reflect any overestimate or underestimation in PY2014.")* The Upstream Lighting Program draft report, however, did not revisit these calculations, particularly if the PY2014 assumptions needed to be adjusted. The final Upstream Lighting Program draft report did present these calculations, and adjusted the PY2014 lighting spillover and market effects downward from 28 percent combined to 9 percent combined. Since the PY2014 report was considered final, the impact of these savings was reflected in the PY2015 estimates, in which 37,783 MWh were deducted from the PY2015 savings estimates.

[16] Memo to the Massachusetts Program Administrators and Energy Efficiency Advisory Council, From NMR Group and Cadmus, March 24, 2015.

Low Income Program

- ***Delta watts***: Cadmus responded to the EM&V Auditor draft report and recognized that the program may be removing working incandescent bulbs, and adjusted the savings with an early replacement scenario with a one-year higher delta watts followed by a lower (halogen baseline) for the Remaining Useful Life.

Home Energy Analysis

- ***More focus should key performance indicators****:* While the utility benchmarking information provided in the evaluation is interesting more focus on key performance indicators, such as cost effectiveness, savings and cost per participant, and so on would help increase the understanding of why this program pilot has not succeeded, and what could be done to improve this interesting offering (HEA Program Report PY2015, p. 50).

BizSavers:

- ***Variance between kW and kWh savings versus goals*:** For example, the Evaluators report a kW savings of the new construction program of nearly 10 times goal, but the kWh savings is only approximately five times goal. Additionally, there are programs where the ratio of kW to kWh savings reflected in the goals do not match the ratio of kW to kWh savings in the evaluated savings. The final report should provide documented reasons for these results.
- ***Variances in Budgets Relative to Planned Targets:*** Similarly, the BizSaver's Program's performance varied greatly from its planned targets. The Evaluator should analyze and report on the reasons and result of the large differences. This performance, which was done within the original budgets, should be discussed by the Evaluator. Furthermore, Evaluator should also analyze and provide reason for the large deviation from the goals and the result of such deviations.

EM&V Auditor's Assessment of the Cost Effectiveness Analysis

Cost-Effectiveness equations in the initial draft reports used the wrong values, though these issues have since been corrected in the final reports. In our review of the initial draft reports, we found several serious errors in the cost-effectiveness section of the reports including:

- The refrigerator recycling program TRC table (Table 43) program overhead costs is missing the implementation/participation costs of $75,588 (should be a total of $1,870,159, not $1,794,571). This issue has since been corrected.
- The residential programs did not report any cost of conserved energy, nor was there any output in the DSMore file (cost-effectiveness calculators). This issue has since been corrected.
- The EM&V Auditor Team could not audit the initial PY2015 costs relative to the DSMore cost-effectiveness files because the appropriate tables were missing in the original PY2015 report. This issue has since been resolved with the second draft report submittal.
- The detailed BizSavers cost effectiveness results, as reported in the initial report, in Appendix N, contained numerous transposed and misreported cost data (incentives reported as overhead as one example). These issues have since been corrected for the second draft report.

4.2 Summary of 4 CSR 240-22.070(8) Requirements

As part of the 4 CSR 240-22.070(8) requirements, the program evaluations were required to meet specific requirements specified in 4 CSR 240-22.070(8). Based on the feedback from the EM&V Auditor Team, Cadmus has significantly enhanced the CSR write ups for most programs. Together, with the insights from ADM, the CSR summaries now provide some additional insights which is a primarily goal for these process evaluations.

Process Evaluation Findings

Table 22 summarizes the findings from Issue 1 and reflect the new insights provided by Cadmus based on the EM&V Auditor feedback.

Table 22: 4 CSR 240-22.070(8) Issue #1

Program	2015 Summary Response	2014 Summary Response	Comment
Efficient Products	Prior research has indicated that lack of energy-efficiency awareness and the higher upfront cost of energy-efficient products are common barriers to this market segment. The PY2015 evaluation did not determine that these imperfections have been addressed and it is assumed that the primary market has remained stable across the PY2013-PY2015 period.	It is assumed that the primary market remains largely unchanged from PY2013, and lack of energy-efficiency awareness and the higher upfront cost of energy-efficient products are common barriers to this market segment.	This was updated based on feedback from the EM&V Auditor
Home Energy Analysis	The primary market imperfection common to the target market remains largely unchanged from PY2013: customers have inadequate information and/or knowledge regarding the benefits of increasing energy efficiency within existing homes.	The primary market imperfection common to the target market is inadequate information and/or knowledge regarding the benefits of increasing energy efficiency within existing homes.	This was updated based on feedback from the EM&V Auditor
Heating and Cooling Program Summary	The primary market imperfection common to the target market was inadequate information and/or knowledge regarding the energy-saving benefits of proper HVAC maintenance and, high-efficiency heating and cooling systems for cooling and electric heating, and the use of electric resistance heating. Additionally, the investment/cost of installing a new HVAC unit deterred customers from ultimately making the decision to purchase until absolutely necessary. Further, when customers replaced a system, the greater upfront cost of high-efficiency systems could cause them to purchase a lower-efficiency unit, even if the lifetime operating costs of the system were greater.	The primary market imperfection common to the target market is inadequate information and/or knowledge regarding the energy saving benefits of proper HVAC maintenance and high-efficiency systems for cooling and electric heating. Additionally, the investment/cost of installing a new HVAC unit deters customers from ultimately making the decision to purchase until absolutely necessary. Further, when customers replace a system, the greater upfront cost of high-efficiency systems can cause them to purchase a lower-efficiency unit, even if the lifetime operating costs of the system are greater.	Response was slightly updated based on feedback from EM&V Auditor

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Program	2015 Summary Response	2014 Summary Response	Comment
Lighting Program	The rapid pace of change in the lighting sector means customers continue to face an information barrier. The PY2015 resident survey indicates customers are becoming more familiar with different technology types, such as halogens, LEDs and CFLs. However, the typical lighting customer probably still does not recognize or understand the variety of options in lighting products currently on the market. Further complicating this issue is the fact that new products, such as non-ENERGY STAR LEDs, are emerging on shelves. As a result, customers fall back on price to determine which products they buy, and less efficient options continue to be less expensive than high efficiency bulbs.	Customers lack information about energy-efficient lighting options (e.g., the difference in HOU, energy use, lighting quality), and the prices for some energy-efficient bulbs remain much higher than the incandescent baseline.	Response was slightly updated based on feedback from EM&V Auditor
Low Income Program	It is assumed that the primary market remains largely unchanged from PY2013 and the primary market imperfections included: split incentives between property managers and tenants; and the work required by the property manager/maintenance staff to facilitate installations.	The primary market imperfections include: split incentives between property managers and tenants; and the work required by the property manager/maintenance staff to facilitate installations.	This was updated based on feedback from the EM&V Auditor
Refrigerator Recycling Program	There were no changes to the primary market for refrigerator recycling in Ameren MO territory in PY2015. The primary market imperfections common to the target market are an inadequate understanding of the operating costs of old or secondary refrigerators, misconceptions regarding the market for used appliances or costs associated with appliance disposal, and, in many cases, the inability to physically discard the appliance without assistance.	The primary market imperfection common to the target market is inadequate understanding of the operating costs of old or secondary refrigerators, misconceptions regarding the market for used appliances or costs associated with appliance disposal, and, in many cases, the inability to physically discard the appliance without assistance	This was updated based on feedback from the EM&V Auditor
BizSavers	Findings from this evaluation point to several possible types of "market imperfections" or structural factors that may affect the ability of Ameren Missouri customers to undertake energy efficiency upgrades (on their own or through the BizSavers programs). The previous evaluation identified three of these: cost, lack of program awareness, and busy-ness size. This evaluation provided evidence that other factors may include geography and possibly the level of preparation of retro-commissioning service providers. Several of these factors are to some degree interrelated.	The lack of capital issue disproportionately affects small businesses, which constitute a slightly smaller percentage of total program savings than their share of total building area would predict. Small businesses are notoriously difficult to reach, and Lockheed Martin staff reported a wide range of activities designed to improve the program's reach into that segment. Lockheed has not yet distributed free direct-install measures, which is a cost-effective method for achieving savings in the small business segment.	

(Refrigerator Recycling, PY2014, p.21: HVAC PY2014, pp. 21-22; Low Income Program, PY2014, p. 23; Lighting Program, PY2014, p. 37; HEA, PY2014, p. 23; Efficient Products Program, PY2014, p. 38; BizSavers Report, PY2014, pp. 1-10-1-14: Residential Portfolio Summary PY2015, pp. 28-39: BizSavers Evaluation PY2015, pp 1-9-10).

The Evaluators provided additional new information regarding the progress that the BizSavers and Low Income program had made regarding addressing this issue as well as adding some additional information based on the PY2015 process evaluations of the residential programs.

Table 23: 4 CSR 240-22.070(8) Issue #2

Program	2015 Summary Response	2014 Summary Response	Comment
Efficient Products	PY2013 findings indicated the target market of all residential customers is appropriate for the equipment rebate programs. The target market segments remain unchanged from PY2013 and it was determined that a market study would not be completed in PY2014 or PY2015. .	The target market segments remain unchanged from PY2013 and it was determined that a market study would not be completed in PY2014. Based on PY2013 findings, the target market of all residential customers is appropriate for the equipment rebate programs; Efficiency Kits are limited to those with electric water heating. This is appropriate for this program.	This was updated based on feedback from the EM&V Auditor
Home Energy Analysis	The program may have benefitted from focusing on additional segments within its target market of dual fuel customers. Moreover, the is an appropriate market segment. The program could have potentially increased overall uptake if the target market had not been limited to dual fuel customers, however, single fuel customers may provide less savings per home.	Yes, the current market segment is appropriately designed. The program may realize higher audit rates or uptake of rebated measures through additional population segmentation of the current target market.	
Heating and Cooling Program Summary	The target market segment was appropriately defined and comprehensively served for the single-family residential market. The program could be expanded in 2015 to include multi-family homes to increase participation. “rowhouses” (townhouse-style buildings with more than four units). Specifically, the Heating and Cooling Program was designed to help customers maintain the efficiency of operable systems (through tune-ups) and offered tiered incentives for customers replacing a failed and functional system (early retirement).	The target market segment is appropriately defined and comprehensively serves the single-family residential market. The program could include multi-family homes to increase participation. Specifically, the HVAC Program is designed to help customers maintain the efficiency of operable systems (through tune-ups), and offers tiered incentives for customers replacing a failed and functional system (early retirement).	Response was slightly updated based on feedback from EM&V Auditor
Lighting Program	The target market for the Lighting program is determined by measure. For standard lighting measures, the program targets the subsets of the general residential lighting market that have had less exposure or access to high-efficiency lighting. For specialty light-in measure, the program targets the residential lighting market more broadly. This is appropriate as the general customer base is becoming more familiar with high-efficiency	The Lighting market is broadly defined, though the program is moving in the direction of targeting bulbs to new audiences, such as discount-retail shoppers. Recent market research shows younger customers could be a more interested audience.	

	technology, though more so for general purpose bulbs than specialty bulbs.		
Program	**2015 Summary Response**	**2014 Summary Response**	**Comment**
Low Income	The low-income, multifamily market could have been merged with a low-income, single-family market; however, this concept was suspended due to stakeholder concerns. Additionally, the current target market could be revised to include low-income tenants.	The low income, multifamily market could be merged with a low income, single-family market; however, this concept has been suspended because of stakeholder concerns.	This was updated based on feedback from the EM&V Auditor
Refrigerator Recycling Program	Without conflicting evidence, based on PY2015 research, we continue to feel the target market segment is appropriately defined as it serves all single-family residential customers regardless of the appliance's usage type (primary or secondary), age, part-use, or aesthetic condition.	Yes, the target market segment is appropriately defined as it serves all single-family residential customers regardless of the appliance's usage type (primary or secondary), age, part-use, or aesthetic condition.	This was updated based on feedback from the EM&V Auditor
BizSavers	As was found in the previous evaluations, the range of business types in Ameren Missouri territory were well represented among standard and custom retrofit projects, suggesting that the program is effectively reaching the main segments of the target market. As noted above, small businesses are somewhat under-represented in terms of savings.	As was found in the 2013 evaluation, projects were distributed across a range of business types in rough proportion to the distribution of business types in the general population, suggesting that the program is effectively reaching the main segments of the target market. As noted above, small businesses constitute a slightly smaller percent age of total program savings than their share of total building area would predict.	
	The current evaluation found evidence that awareness of the retro-commissioning program may vary among busy-ness types, being greatest among those that typically employ in-house facility managers, such as hospitals, large hotels and casinos, and universities. Some evidence suggests that there may be greater awareness of the retro-commissioning compressed air option than the building optimization among industrial customers, resulting from that fact that one RSP that specializes in compressed air service serves a high share of the industrial market. Such findings do not necessarily suggest a need to alter the way the target market segment is defined, but rather to adjust some aspects of program delivery		

(Refrigerator Recycling, PY2014, p.21: HVAC PY2014, pp. 21-22; Low Income Program, PY2014, p. 23; Lighting Program, PY2014, p. 37; HEA, PY2014, p. 23; Efficient Products Program, PY2014, p. 38; BizSavers, PY2014, pp. 1-10-1-14: Residential Portfolio Summary PY2015, pp. 28-39: BizSavers PY2015, pp 1-9-10).

Consistent with the previous findings, the Evaluators provided little new information based on the findings from the PY2015 program evaluations. The Evaluators did expand and build upon their previous evaluations to provide additional guidance regarding developing effective measure mix strategies (see Table 24).

Table 24: 4 CSR 240-22.070(8) Issue #3

Program	2015 Summary Response	2014 Summary Response	Comment
Efficient Products	The Efficient Products program continues to be a highly diverse program, offering 13 energy-efficient home technologies Include in HVAC, lighting, plug-load, pumps, and water heating end-uses. This is a highly diverse program dynamic, responsive program, as demonstrated by the addition of multiple measures in PY2014 and the discontinuation of measures in PY2014 and PY2015.	No response in 2014	
Home Energy Analysis	The mix of end-use measures offered through the program was appropriate in PY2015 with the addition of electric water heater measures.	The mix of end-use measures offered through the program is appropriate; however, measure eligibility should be reviewed to include water heater measures with electric water heaters.	
Heating and Cooling Program Summary	The program targeted the primary end-use technologies within the targeted market segment. When given the opportunity to offer suggestions for program changes or improvements, participating contractors and participants did not suggest that the program precluded any type of end-use measure. Thermostat with internet connectivity and adaptive temperature control strategies are relatively new to the market. The program could include incentives for this type of measure.	The program targets the primary end-use technologies within the targeted market segment.	This was updated based on feedback from the EM&V Auditor

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Program	2015 Summary Response	2014 Summary Response	Comment
Lighting Program	For the most part, yes. The program offers a diversity of products both LEDs and CFLs that represent the majority of common consumer lighting needs, including a range of wattages, and specialty bulbs such as dimmables, globes, decorative shapes, three-way and four-way bulbs and reflectors, and LED bulbs. However, the emergence of non-ENERGY STAR® bulbs that offer the same energy savings at a fraction of the price (as a result of limiting non-energy features) may be meeting customer demand for high efficiency at an even lower price than available from the program.	Yes. The program offers a diversity of products that represent the majority of common consumer lighting needs, including a range of wattages, and specialty bulbs such as dimmables, globes, and reflectors, and LED bulbs. This year the program added occupancy sensors as well.	This was updated based on feedback from the EM&V Auditor
Low Income	The mix of measures were appropriate for multifamily buildings for low-income residents. The program measures addressed lighting, water heating, appliances, and heating, and cooling. In PY2014, advanced power strips were discontinued because of low evaluated savings. Additional measures were supplied in PY2014 for households with natural gas heating or water heating. Program stakeholders have also suggested including ceiling insulation, air sealing, windows, CAC repair, and LEDs in future program cycles.		This was updated based on feedback from the EM&V Auditor
Refrigerator Recycling Program	Yes, the current mix of end-use measures included in the program is appropriate. In PY2013, the program began collecting room air conditioners and dehumidifiers with eligible refrigerators and freezers, which provided additional benefits for customers and savings for Ameren Missouri. The program continued this practice in PY2014 and PY2015. As recommended in PY2013, the program could also provide energy efficiency kits including CFLs and other easy to install measures to achieve deeper savings and encourage participation in other programs.	Yes, the current mix of end-use measures included in the program is appropriate. In PY2013 the program began collecting room air conditioners and dehumidifiers with eligible refrigerators and freezers, providing additional benefits for customers and savings for Ameren Missouri. The program continued this practice in PY2014. As recommended in PY2013, the program could also provide energy-efficiency kits (including CFLs and other easy-to-install measures) to achieve deeper savings and encourage participation in other programs.	This was updated based on feedback from the EM&V Auditor

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Program	2015 Summary Response	2014 Summary Response	Comment
BizSavers	The interviewed new construction participants generally indicated that the range of program-eligible equipment met their needs, but this must be viewed in the context that the program reached most of these participants after the design phase, when their "equipment needs" largely consisted of lighting. The interviewed new construction trade allies reported that the modeling requirements for doing custom measures in new construction projects took too long to fit within the construction timelines; earlier program involvement in new construction projects could reduce the time pressure that may limit savings from custom measures.	*The range of equipment generally meets the needs of respondents. Equipment is generally delivered with little delay. Participants are largely satisfied with the quality of the installed equipment and the quality of installation. Standard program participants that decided not to pursue the custom option did so primarily because the standard option covers their equipment needs.* However, one-third of surveyed participants did not find the range of qualified equipment to be acceptable although none provided details on what might be missing. One possible cause of dissatisfaction may have been a requirement that lighting upgrades from T-12 to more efficient lamping use T-8 as the baseline case. Program staff reported that the T-8 baseline did not provide adequate incentive for changing T-12s. Late in the year, Lockheed obtained permission to begin using a T-12 baseline, and staff reported positive feedback. The evaluation team will investigate the response to the change in baseline more formally in the 2015 evaluation.	
	As previous evaluations found, participant and trade ally surveys showed satisfaction with the range of program-eligible equipment, delivery time for ordered equipment, and the quality of the equipment and the installation. Findings from the trade ally survey from this year's evaluation suggest that T-12 lighting makes up more than one-third of tube lighting in Ameren Missouri service, which suggests that the program-eligible tube lighting types remain viable replacements options.		
	Retro-commissioning participants continue to be highly satisfied with the services they received, the cost savings, and the performance of the program measures. Industrial customers, however, may not be completely aware of the full range of retro-commissioning options available to them because one RSP that specializes in compressed air service serves a high share of the industrial market.		

(Refrigerator Recycling, PY2014, p.21: HVAC PY2014, pp. 21-22; Low Income Program, PY2014, p. 23; Lighting Program, PY2014, p. 37; HEA, PY2014, p. 23; Efficient Products Program, PY2014, p. 38; BizSavers Report, PY2014, pp. 1-10-1-14: Residential Portfolio Summary PY2015, pp. 28-39: BizSavers PY2015, pp 1-9-10).

The BizSavers process evaluation provided excellent examples of the new communication and marketing strategies that are being used to attract program participants while also identifying additional areas for program improvement. The residential program evaluations also provided some additional insights based on the PY2015 evaluations as Table 25 shows.

Table 25: 4 CSR 240-22.070(8) Issue #4

Program	2015 Summary Response	2014 Summary Response	Comment
Efficient Products	Unchanged from PY2014, the delivery channels are appropriate and reach customers through retail and direct-mail efforts, including in-store advertisements, bill inserts, contractors, postcards, and Ameren Missouri's website. In PY2015, outreach to multifamily property owners resulted in increased installation of kit products.	The delivery channels are appropriate and reach customers through retail and direct-mail efforts, including in-store advertisements, bill inserts, contractors, postcards, and Ameren Missouri's website.	This was updated based on feedback from the EM&V Auditor
Home Energy Analysis	Yes, communication and delivery channels were appropriate. Future program design should consider the impact of the audit fee on recruitment and overall program performance.	Yes, current communication and delivery channels are appropriate.	
Heating and Cooling Program Summary	Current communication channels were appropriate. The program expanded marketing efforts in PY2015 and communicated information through high-propensity direct marketing, television advertisements and banners, website and internet radio advertisements and also increased its outreach to equipment distributors. Participating contractors contributed to marketing strategies during contractor advisory group sessions.	Yes, current communication channels are appropriate as the program uses both mass media marketing to generate demand and interest in the program as well as targeted marketing through trained local HEATING AND COOLING contractors.	Response was slightly updated based on feedback from EM&V Auditor
Lighting Program	Retailers report Ameren Missouri signage is effective. As the big box stores that typically partnered with the program in the past are now carrying and selling more high-efficiency product on their accord, the program has shifted a greater percentage of sales to non-big-box retailers. The placement-based marketing techniques that were effective at driving very high volumes through big box stores are no longer available for lower-volume measures still sold through big box stores, or for more common measures sold through non big box outlets. The program has identified some new marketing techniques, but in general relies less on placement marketing than in the past. This is appropriate for the lower sales targets in the current year relative to PY2013 and PY2014.	Retailers report Ameren Missouri signage is effective. New market research indicates greater online activity could effectively target younger customers.	Response was updated based on feedback from EM&V Auditor

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Program	2015 Summary Response	2014 Summary Response	Comment
Low Income	The communication channels for the target market included direct contact with property managers by Honeywell staff as well as word-of-mouth. Communication with tenants was handled by property managers through workshops with Honeywell staff and directly with installation contractors in apartments. The delivery mechanism was direct installation, performed by program subcontractors. The communication and delivery mechanism were necessarily direct and hands-on as both the tenant and property managers were considered a hard-to-reach population and have split incentives	The communication channels for the target market include direct contact with property managers by Honeywell staff. Communication with tenants is handled by property managers, through workshops with Honeywell staff, and directly with installation contractors in apartments. The delivery mechanism is direct installation, performed by program subcontractors. The communication and delivery mechanism are necessarily direct and hands-on as both the tenant and property managers are considered a hard-to-reach population and have split incentives.	Response was updated based on feedback from EM&V Auditor
Refrigerator Recycling Program	Yes, delivery channels are appropriate. The implementer ARCA handles scheduling and pick-up for appliances recycled through the program, which makes the program convenient for participants	The implementer ARCA handles the scheduling and pickup for appliances recycled through the program. Participants expressed very high satisfaction with the program, suggesting that the communication channels and delivery mechanisms are appropriate.	Response was updated based on feedback from EM&V Auditor
BizSavers	The BizSavers program exceeded savings goals for 2015. The implementer introduced some new outreach approaches in 2015, including conducting targeted outreach to decision makers representing customer account aggregates or "towers." Evidence suggests that this approach has been effective within St. Louis and suburbs but not as effective in outer areas. There is still evidence of low awareness of BizSavers incentives in general and of new construction incentives in particular. Even participants with past BizSavers program experience did not seek out new construction incentives prior to designing their building. There is some evidence that some RSPs may not provide detailed explanations of retro-commissioning to prospective customers. Retro-commissioning does not appear to be a core part of the business of many approved RSPs. The implementer's general outreach to trade allies does not encompass specific work with RSPs, which may limit the program's ability to ensure that RSPs are appropriately prepared to provide information on the range of retro-commissioning options and benefits.	Several evaluation findings speak to the appropriateness of program communication and delivery channels and mechanisms. The non-participant survey showed moderate program awareness, driven by BizSavers marketing and information from contractors and associates. The participant survey showed that vendors and contractors were the most common source of program awareness, but program staff tended to bring in larger projects and accounted for nearly as much total savings as contractors and vendors. Only about one-third of non-participants were aware of new construction incentives, and awareness was lower for retro-commissioning incentives.	

(Refrigerator Recycling, PY2014, p.21: HVAC PY2014, pp. 21-22; Low Income Program, PY2014, p. 23; Lighting Program, PY2014, p. 37; HEA, PY2014, p. 23; Efficient Products Program, PY2014, p. 38; BizSavers, PY2014, pp. 1-10-1-14: Residential Portfolio Summary PY2015, pp. 28-39: BizSavers PY2015, pp 1-9-10).

Consistent with the previous findings, the BizSavers evaluation identified additional strategies and provided recommendations on ways to reduce these barriers based on the findings from the process evaluations. The residential summaries did not include any new information nor incorporate any of Cadmus' recommendations on ways to improve customer acceptance and implementation based on the 2015 program evaluation (see Table 26).

Table 26: 4 CSR 240-22.070(8) Issue #5

Program	2015 Summary Response	2014 Summary Response	Comment
Efficient Products	Program promotions that provide program and energy education can help to overcome market imperfections. Timing product promotions so that they coincide with seasons of high use may also help implementation, as demonstrated by the higher participation in the pool pump rebate in PY2015.	Continued promotion and education can continue to overcome market imperfections. In PY2014, we found that Installation rates were lowest for measures included in the kits containing advanced power strips.	This was updated based on feedback from the EM&V Auditor
Home Energy Analysis	Additional customer education and awareness was needed regarding the benefits—financial and nonfinancial—of that the program's major measures contribute by increasing the efficiency and comfort of their homes. Future programs should focus more resources on case studies to be especially communicated with regard to air sealing. Communicate the benefits of the major measures.	Additional customer education and awareness is needed regarding the benefits—financial and nonfinancial—of increasing the efficiency and comfort of their homes. This should be especially communicated with regard to air sealing.	This was updated based on feedback from the EM&V Auditor
Heating and Cooling Program Summary	The marketing materials allocated a significant proportion of resources specific to the targeted market. In the first program year, the most common suggestion for improvement from program participants surveyed was the need to increase program awareness and benefits, an indication that marketing efforts should continue or increase. The program could continue to perform billing data analysis to market to customers with relatively high apparent heating and cooling energy consumption.	The current marketing materials allocate a significant proportion of resources specific to the targeted market. In the first program year, the most common suggestion for improvement from program participants surveyed was the need to increase program awareness and benefits, an indication that marketing efforts should continue or increase. The number of participants surveyed in PY2014 who suggested increasing program marketing declined from PY2013 to PY2014. This is an indication that marketing is effectively reaching more Ameren Missouri customers but should continue in PY2015.	Response was slightly updated based on feedback from EM&V Auditor
Lighting Program	Ameren Missouri continues to reach out to more retailers and audiences and to expand the list of eligible measures. As the volume of the program falls, it is more difficult to find an appropriate place and time in store front locations for the educational promotion activities that help customers learn to navigate new lighting options. Ameren Missouri should shift educational focus as well as marketing focus to more online activity, as a lower	Ameren Missouri continues to reach out to more retailers and audiences and to expand the list of eligible measures, but awareness of the program remains low. Ameren Missouri has commissioned market research to identify market segments and should use this information to experiment with new messaging and market channels.	This was updated based on feedback from the EM&V Auditor

	cost alternative to face-to face interaction.		
Program	**2015 Summary Response**	**2014 Summary Response**	**Comment**
Low Income	The Low Income Program design and implementation had great success for several years, with high levels of participation and tenant acceptance of new measures. Many federally-subsidized properties were treated, and LIHTC properties generated additional participation. It is likely that most multifamily properties with at least 50% low-income residents will be treated in the next few years. It may behoove the program to consider drawing in some market rate properties under different cost-effectiveness criteria in future program cycles. Alternatively, the program can assess the feasibility of treating individual units as opposed to the requiring treatment of the entire complex.	The Low Income Program design and implementation has had great success for several years, with high levels of participation and tenant acceptance of new measures. Many federally subsidized properties have been treated, and LIHTC properties are generating additional participation. It is likely that most multifamily properties with at least 50% low income residents will be treated in the next few years. It may behoove the program to consider drawing in some market rate properties under different cost-effectiveness criteria.	Response was slightly updated based on feedback from EM&V Auditor
Refrigerator Recycling Program	Cadmus recommends that the program continue to explore new communication channels through which customers can learn about the program. Possible channels could include advertising through social media, YouTube, and other popular social network sites. .	In PY2013 Cadmus suggested that customer acceptance and awareness of appliance operating costs could potentially be increased through additional online advertising (such as Google AdWords or Pandora targeted ads) and earned media (through partnerships with local non-profit organizations). In PY2014 Ameren implemented the advertising recommended by Cadmus, but there is still an opportunity to increase awareness through earned media in PY2015.	Response was updated based on feedback from EM&V Auditor
BizSavers	Any future program implementer should work to increase promotion of the new construction and retro-commissioning incentives to customers doing standard and custom retrofit projects.	*Lockheed Martin should continue to work to clarify application instructions,* particularly for the custom program, and ensure that service providers and end-users know whom they can contact to get assistance with applications. Lockheed should consider relabeling the "Custom" icon on the online application to say "Standard and Custom" or provide separate icons for accessing the standard and custom worksheets.	

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Program	2015 Summary Response	2014 Summary Response	Comment
BizSavers	Any future program implementer should intensify outreach to architects and design engineers to improve new construction program uptake.	Lockheed Martin staff should continue to work to improve program penetration of the small business sector and should consider additional approaches that may include free direct install of low-cost measures to generate immediate cost-effective savings and generate interest in future projects. Staff should also consider conducting additional market research to provide information on specific needs and motives of small business segments.	
	Any future program implementer should work with RSPs to ensure that they are appropriately prepared and understand the value of fully explaining all aspects of retro-commissioning to prospective participants, focusing on equipment optimization and monitoring.	Ameren Missouri and Lockheed Martin should continue to work together to increase awareness of the new construction and retro-commissioning incentives and of the benefits of participation in those programs. In particular, Ameren Missouri and Lockheed Martin should make efforts to ensure that Account Executives, Customer Support Agents, and trade allies promote the new construction program in all discussions with customers, as achieving that program's full potential requires identifying projects before the design phase has begun.	
	Ameren Missouri and any future implementer should continue and expand outreach efforts in parts of the Ameren Missouri service territory outside of St. Louis and its suburbs, particularly to small businesses in those areas.		
	Ameren Missouri should consider adding customer type information to its customer database.		

(Refrigerator Recycling, PY2014, p.21: HVAC PY2014, pp. 21-22; Low Income Program, PY2014, p. 23; Lighting Program, PY2014, p. 37; HEA, PY2014, p. 23; Efficient Products Program, PY2014, p. 38; BizSavers Report, PY2014, pp. 1-10-1-14: Residential Portfolio Summary PY2015, pp. 28-39: BizSavers PY2015, pp 1-9-10).

Impact Evaluation Findings

As part of the 4 CSR 240-22.070(8) requirements, the program evaluations were required to meet specific requirements specified in 4 CSR 240-22.070(8) for impact evaluations. These requirements are summarized next.

The utility shall develop methods of estimating the actual load impacts of each demand-side program and demand-side rate included in the utility's preferred resource plan to a reasonable degree of accuracy.

1. Impact evaluation methods. At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:

A. Comparisons of pre-adoption and post-adoption loads of program or demand side rate participants, corrected for the effects of weather and other intertemporal differences; and

B. Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same time period.

2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:

A. Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses; or

B. Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.

C. The utility shall develop protocols to collect data regarding demand-side program and demand-side rate market potential, participation rates, utility costs, participant costs, and total costs.[17]

The following tables summarize the ways in which the residential and C&I program evaluations met these criteria.

[17] AUTHORITY: sections 386.040, 386.250, 386.610, and 393.140, RSMo 2000. * Original rule filed June 12, 1992, effective May 6, 1993. Amended: Filed Oct. 25, 2010, effective June 30, 2011.
*Original authority: 386.040, RSMo 1939; 386.250 RSMo 1939, amended 1963, 1967, 1977, 1980, 1987, 1988, 1991, 1993, 1995, 1996; 386.610, RSMo 1939; and 393.140, RSMo 1939, amended 1949, 1967.